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UNITED STATES OF AMERICA:
WAR DEPARTMENT.

MONTHLY WEATHER REVIEW.

(GENERAL WEATHER SERVICE OF THE UNITED STATES.)

JANUARY, 1883.

PREPARED UNDER THE DIRECTION OF
BRIG. & BVT. MAJ. GEN'L W. B. HAZEN,
CHIEF SIGNAL OFFICER OF THE ARMY.

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WASHINGTON:
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1883.

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List of merchant marine steam and sailing vessels from which International Simultaneous Meteorological reports were received at the Office of the Chief Signal Officer, U. S. Army, Washington, D. C., in time to be used in the preparation of the Monthly Weather Review for the month of January, 1883.
(Arranged alphabetically.)

Nation- ality.	Rig.	Name of vessel.	Name of observer, with title.	Nation- ality.	Rig.	Name of vessel.	Name of observer, with title.
<i>Allen Line.</i>				<i>Pacific Coast Steamship Company.</i>			
British	Steamship.	Nova Scotian	Captain W. Richardson.	American	Steamship.	Ancon	John N. Ingalls.
Do	Do	Scandinavian	John Park.	Do	Do	Orizaba	Chas. B. Johnson.
<i>American Line.</i>				Do	Do	State of California	G. Debnay.
Do	Do	British Crown	E. H. Freeth.	<i>Pacific Mail Steamship Company.</i>			
Do	Do	British Prince	George Burton.	Do	Do	Australia	Captain A. N. M. Tulloh.
Do	Do	Lord Clive	P. Urquhart.	Do	Do	City of New York	W. B. Cobb.
Do	Do	Lord Gough	E. M. Hughes.	Do	Do	Colima	Robt. R. Searle.
American	Do	Indiana	R. W. Sargent.	Do	Do	San José	D. S. Austin.
Do	Do	Pennsylvania	Geo. H. Dodge.	<i>Quebec Steamship Company.</i>			
<i>Amsterdam Line.</i>				British	Do	Muriel	G. S. Locke.
Dutch	Do	Stella	W. J. C. Ten Harsen.	<i>Red "D" Line.</i>			
<i>Anchor Line.</i>				American	Do	Caracas	W. M. Hopkins.
British	Do	Bolivia	James Donaldson.	Do	Do	Valeucia	Samuel Hess.
<i>Atlantic Transportation Company.</i>				<i>Red Star Line.</i>			
Do	Do	Surrey	Rowland Hill.	Belgian	Do	Belgenland	Joseph Stokes.
<i>Atlas Line.</i>				Do	Do	Nederland	J. Ueberweg.
Do	Do	Antillas	R. de Echevarrieta.	Do	Do	Switzerland	W. A. Beynon.
<i>Beaver Line.</i>				Do	Do	Waesland	H. Nickels.
Do	Do	Lake Huron	William Bernson.	<i>Rotterdam Line.</i>			
Do	Do	North's Steamship Company. (Whit.)	Edw. Biscoe.	Dutch	Do	Mona	G. Bakker.
Ambrose	Do	Bristol-City Line.	T. L. Weiss.	Do	Do	W. A. Scholten	G. I. Vis.
<i>California and Mexican Steamship Co.</i>				Do	Do	Zaandam	E. M. Chevallier.
American	Do	Mexico	Thomas Huntington.	<i>State Line.</i>			
<i>Canard Line.</i>				British	Do	State of Georgia	G. Moodie.
British	Do	Bohnia	Wm. McMickan.	Do	Do	State of Indiana	John W. Sadler.
Do	Do	Gallia	W. H. P. Hains.	American	Do	Colorado	M. B. Crowell.
Do	Do	Marathon	R. Woolfenden.	Do	Do	Rio Grande	A. C. Burrows.
Do	Do	Parthia	Henry Walker.	Do	Do	San Marcos	Jas. Bolger.
<i>General Transatlantic Steamship Co.</i>				<i>Warner and Merrill Line.</i>			
French	Do	Canada	E. Frangon.	Do	Do	D. J. Foley	Chas. B. Dickman.
Do	Do	France	P. d'Hauterive.	<i>White Cross Line.</i>			
Do	Do	Labrador	Ades Servan.	Belgian	Do	Plantyn	Robert Scott.
Do	Do	Pereire	C. Berry.	<i>White Star Line.</i>			
Do	Do	Ville de Marseille	Tal. Cahour.	British	Do	Adriatic	J. W. Jennings.
<i>Gulf Line.</i>				Do	Do	Baltic	H. Parsell.
British	Do	Abyssinia	Edw. Bentley.	Do	Do	Britannic	H. Perry.
Do	Do	Arizona	Sam. Brooks.	Do	Do	Germanic	C. W. Kennedy.
<i>Hamburg-American Line.</i>				Do	Do	Republic	P. J. Irving.
German	Do	Bohemia	O. Penoldt.	<i>Wilson Line.</i>			
Do	Do	Frisia	A. Kulewein.	Do	Do	Lepanto	J. T. Rogers.
Do	Do	Rugia	A. Albert.	Do	Do	Marengo	J. H. Malet.
Do	Do	Silesia	C. Kordell.	Do	Do	Otranto	Richard Potter.
Do	Do	Wieland	C. Heibich.	Do	Do	Salerno	E. E. Wilson.
<i>Johnston Line.</i>				<i>Winnor Line.</i>			
British	Do	Mentmore	Thos. Amiot.	American	Do	Aries	H. W. Googins.
Do	Do	Lampert and Holt's Steamship Co.	W. H. Stapledon.	Do	Do	Catherine Whiting	John Horton Briggs.
Do	Do	Sirtus	E. Parry.	Do	Do	Norman	P. A. Nickerson.
<i>Lyons Line.</i>				Do	Do	Saxon	S. W. Snow.
Do	Do	Bulgarian	M. Fitt.	<i>Miscellaneous.</i>			
Do	Do	Virginian	Domenico Viola.	British	Do	Amaryllis	Chas. Hiff.
<i>Mediterranean and N. Y. Steamship Co.</i>				Spanish	Do	Antonio Lopez	Eugenio Bayona.
Italian	Do	Archimede	V. T. Hein.	British	Do	Darlington	Geo. Dulling.
<i>Merchants' Express Company to Harre.</i>				Do	Do	Foscilia	Chief Officer L. P. Nelson.
Danish	Do	Hermes	W. A. Hallett.	Mexican	Do	J. W. Wilson	Captain Thos. G. Hammond.
<i>Merchants' & Miners' Transportation Co.</i>				American	Do	Laurel	P. L. Cosgrove.
American	Do	Alleghany	H. C. Williams.	Do	Do	Malabar	John Dixon.
Do	Do	Miss. & Dominion S. S. Co. (limited).	Joseph Gibson.	Do	Do	Peconic	John Jenkins.
British	Do	Brooklyn	Fred. Read.	American	Do	Raleigh	Chief Officer Rich'd Zolling.
Do	Do	Dominion	R. B. Quick.	Do	Do	Sunbeam	Captain Thos. Potter.
<i>Morgan's L. & Texas Steamship Co.</i>				American	Do	Annapolis	W. G. Shackford.
American	Do	Chalmette	H. S. Quick.	Do	Do	Algiers	J. H. Percy.
<i>National Line.</i>				Do	Do	Knickerbocker	Kembie.
Do	Do	Egypt	J. Sumner.	Dutch	Do	Laerdam	Sierendregt.
Do	Do	Greece	W. Arthur Griffiths.	American	Ship.	Mount Washington	F. S. Perkins.
Do	Do	Holland	W. Pearce.	British	Steamship.	State of Nebraska	A. G. Braes.
<i>New York & Cuba Mail Steamship Co.</i>				<i>Sailing vessels.</i>			
American	Do	Santiago	John Milligan.	American	Brig	Abbie Clifford	David W. Storer.
<i>N. Y. Havana & Mexican Mail S. S. Co.</i>				British	Schooner	Abbie H. Gheen	W. W. Gheen.
Do	Do	City of Alexandria	F. M. Faircloth.	American	Bark	Aquidneck	C. S. Powell.
Do	Do	City of Merida	L. F. Timmerman.	Do	Brig	Belle of the Bay	R. O. Wellton.
Do	Do	City of Washington	Wm. M. Rettig.	German	Bark	Bremen	Alfred Leitke.
<i>North German Lloyd.</i>				Do	Brig	Champion	W. C. Gardner.
German	Do	America	J. W. Reynolds.	American	Brig	Clara M. Goodrich	E. H. Pray.
Do	Do	Donau	F. Hamelmann.	Do	Barkentine	David A. Preston	F. L. Jones.
Do	Do	General Werder	H. Ringk.	Schooner	Do	Edith H. Seward	Wilbur K. Tall.
Do	Do	Hapsburg	H. Christoffers.	Do	Do	F. E. McDonald	S. P. Kane.
Do	Do	Meln	F. Himbeck.	German	Ship	Gipsy Queen	W. Chandler.
Do	Do	Salier	O. Heimbruch.	Do	Brig	Grey Eagle	Judah Berry, Jr.
Do	Do	Werra	C. Wiegand.	American	Schooner	Hedwig	Th. Missen.
<i>N. & S. American Steam Navigation Co.</i>				Do	Brig	Heinrich & Tonie	L. Meyer.
Do	Do	Claudius	J. Barre.	Do	Schooner	Isabel Alberto	E. F. Bishop.
<i>Occidental and Oriental Steamship Co.</i>				Norwegian	Bark	James Slater	James L. Tucker.
British	Do	Coptic	1st Officer G. Blumberg.	American	Brig	Johanna	Fr. N. Scharffenberg.
<i>Ocean Steamship Company.</i>				British	Brig	L. & W. Armstrong	Albion Alexander.
American	Do	City of Augusta	Captain W. H. Kidley.	Do	Brig	Lillian	H. F. Schive.
<i>Oregon Improvement Company.</i>				Do	Brig	Mary A. Troup	Victor I. Young.
Do	Do	Mississippi	K. S. Nickerson.	American	Schooner	Minnie A. Bonnell	J. L. Bonnell.
Do	Do	Williamette	E. W. Holmes.	British	Ship	Minnie H. Gorow	E. D. Lordley.
Do	Do	City of Chester	L. Meyer.	Danish	Schooner	Ocean Traveller	C. W. Brown.
<i>Oregon Railway and Navigation Co.</i>				American	Schooner	Paramita	A. Humphrey.
Do	Do	Columbia	Thomas Wallace.	Do	Schooner	Pearl Nelson	S. John Kunz.
Do	Do	Oregon	Fred. Bolles.	Do	Schooner	Reindeer	C. V. Decker.
<i>Polemann.</i>				Do	Schooner	S. B. Hubbard	2d Mate A. R. Mahaffey.
<i>Red Star Line.</i>				Do	Schooner	Southern Belle	Captain John F. Sawyer.
<i>Rotterdam Line.</i>				Do	Schooner	Sunbeam	Geo. D. Fraser.
<i>State Line.</i>				Do	Schooner	Wm. Wiler	Joseph Hand.
<i>Texas Line.</i>				<i>Wilson Line.</i>			
<i>White Cross Line.</i>				Do	Do	Wm. Wiler	John H. I. Donahoe.



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MONTHLY WEATHER REVIEW.

WASHINGTON, D. C., JANUARY, 1883.

INTRODUCTION.

This REVIEW presents a general summary of the meteorological conditions which have prevailed over the United States and adjoining territories during the month of January, 1883, and a brief description of the storms occurring in the north Atlantic ocean.

The following may be mentioned as the special features of the month:—

1st.—The very low mean temperature, which is generally below the normal for all parts of the country, the departures being most marked for the upper lake region, the extreme northwest and the upper Mississippi and Missouri valleys for which the monthly means are from 7°.9 to 11°.5 below the January normal. The month has been generally cold throughout, but the weather was especially severe from the 18th to 25th over the districts for which the departures from the normal are the greatest, causing much suffering to the inhabitants, and considerable loss by freezing stock.

2d.—The excessive rainfall over the south Atlantic and east Gulf states, and the marked deficiency in the rainfall in California.

3d.—The heavy snow-storms in the western sections of the country obstructing railroads and interrupting communication of all kinds.

4th.—The very brilliant meteor which was observed on the evening of the 3d, at many stations in Ohio, Indiana, Illinois, Iowa, Michigan, and Wisconsin.

In the preparation of this REVIEW, the following data received up to February 20th, have been used; viz.: the regular tri-daily weather charts, containing data of simultaneous observations taken at one hundred and thirty-six Signal Service stations and fourteen Canadian stations, as telegraphed to this office; one hundred and seventy-eight monthly journals, and one hundred and seventy-one monthly means from the former, and fourteen monthly means from the latter; two hundred and twenty-four monthly registers from voluntary observers; fifty-six monthly registers from United States Army Post Surgeons; Marine Records; International Simultaneous Observations; Marine Reports, through the co-operation of the "New York Herald Weather Service;" abstracts of Ships' Logs, furnished by the publishers of "The New York Maritime Register;" monthly weather reports from the local weather services of Indiana, Kansas, Nebraska, and Missouri, and of the Central Pacific railway company; trustworthy newspaper extracts; and special reports.

NOTE.

The subject of INTERNATIONAL METEOROLOGY, with accompanying charts, heretofore included in the MONTHLY WEATHER REVIEW, will, hereafter, be found with the SUMMARY OF INTERNATIONAL METEOROLOGICAL OBSERVATIONS, and the title of that publication will be: MONTHLY SUMMARY AND REVIEW OF INTERNATIONAL METEOROLOGICAL OBSERVATIONS.

Beginning with this number the charts accompanying the REVIEW will be as follows: chart i., tracks of low-barometer areas; chart ii., ocean storm-tracks; chart iii., isobars, isotherms, and winds; chart iv., precipitation. The tables heretofore printed on the charts, will, hereafter, be published in the body of the REVIEW, under their respective headings.

BAROMETRIC PRESSURE.

[Expressed in inches and hundredths.]

The mean barometric pressure for the month of January, 1883, over the United States and Canada, is shown by the isobarometric lines (in black) on chart iii.

The chart shows a region of high barometer covering parts of northern California and Nevada, and southern Oregon and Idaho, to be inclosed by the isobar of 30.3. The isobar of 30.25 includes a region extending from the Pacific coast between the parallels of 35° N. and 47° N., eastward to Wyoming and Utah. A narrow ridge of high barometer also covers a part of the extreme northwest and the Missouri valley; in the former district, a maximum mean pressure of 30.31 is reported from Fort Buford, Dakota, while to the southward the pressure decreases to 30.18 at Fort Bennett, Dakota, and then increases over the lower Missouri valley to 30.24 at Yankton, Dakota, and Leavenworth, Kansas, and 30.25 at Huron, Dakota, and Omaha, Nebraska. Between these regions of high barometer, a small area, including parts of Wyoming, Colorado, Nebraska, and Kansas, is inclosed by an isobar of 30.15. The isobar of 30.2 incloses nearly the whole of the country lying west of the ninety-fifth meridian, and also includes a narrow strip of country extending from the lower Missouri valley southeastward to the south Atlantic coast. A second isobar of 30.2 embraces a small area near the middle Atlantic coast. The regions of least mean pressure are the Canadian Maritime Provinces and the upper lake region. In the latter district, the lowest monthly means reported are: Marquette, 30.05, and Mackinac City, 30.06. In the Canadian Maritime Provinces, the lowest means are: Sydney, Nova Scotia, 30.03; Chatham, New Brunswick, 30.06; Father Point, Province of Quebec, 30.06.

Compared with the means of the previous month (December, 1882,) the mean pressure is from 0.06 to 0.13 higher on the Pacific coast. In the northern and middle slopes, reports from a few of the most northerly stations show a slight increase, but the pressure is generally lower, and at Cheyenne, Wyoming, and on the summit of Pike's Peak, Colorado, the decrease amounts to 0.12. In all other districts a general increase has taken place, being very slight over the interior and southern sections of the country. In the lower lake region and middle Atlantic states the pressure is from 0.01 to 0.09 higher. The most marked increase of the month occurs over New England and the Canadian Maritime Provinces, where the increase ranges from 0.10 to 0.16.

DEPARTURES FROM THE NORMAL VALUES FOR THE MONTH.

Compared with the January means of previous years, the mean barometric pressure is, with the exception of a slight decrease at a few stations, generally above the normal over the entire country. The most marked departures occur on the Pacific coast north of parallel 35° N., where they range from 0.11 to 0.15 above the normal. In the other districts west of the Mississippi river, the departures vary from 0.02 below to

0.09 above the normal. East of the Mississippi the departures are very slight, except in New England, where the pressure is from 0.05 to 0.10 above the normal. The following are the only stations reporting means below the normal: Fort Bennett, Dakota, 0.02; Cheyenne, Wyoming; Grand Haven, Michigan, Pittsburg, Pennsylvania; Knoxville, Tennessee; Lynchburg, Virginia; and Charlotte, North Carolina, 0.01.

BAROMETRIC RANGES.

The monthly barometric ranges were greatest in the upper lake region, extreme northwest, upper Mississippi and Missouri valleys, north Pacific coast region, and on the middle and south Atlantic coasts. They were least in the southern sections of the country. The greatest monthly ranges reported are as follows: Mackinac City, Michigan, 1.35; Escanaba, Michigan, 1.34; Marquette, Michigan, 1.30. The smallest are: Fort Davis, Texas, 0.48; Key West, Florida, 0.50; Tucson, Arizona, 0.59; Fort McKavett, Texas, 0.59; Silver City, New Mexico, 0.64; Punta Rassa, Florida, 0.66. In the several districts the monthly ranges have varied as follows:—

New England.—From 0.95 on the summit of Mount Washington, New Hampshire, to 1.19 at Eastport, Maine.

Middle Atlantic states.—From 0.94 at Williamsport, Pennsylvania, and 0.79 at Lynchburg, Virginia, to 1.20 at Cape Henry, Virginia.

South Atlantic states.—From 0.92 at Atlanta, Georgia, and Charlotte, North Carolina, to 1.32 at Hatteras, North Carolina.

Florida Peninsula.—From 0.50 at Key West to 0.96 at Cedar Keys.

Eastern Gulf.—From 0.80 at New Orleans, Louisiana, to 0.92 at Starkville, Mississippi.

Western Gulf.—From 0.67 at Fredericksburg, Texas, to 0.97 at Fort Smith, Arkansas.

Rio Grande valley.—From 0.71 at Eagle Pass, to 0.76 at Brownsville, Texas.

Ohio valley and Tennessee.—From 0.90 at Chattanooga, Tennessee, to 1.17 at Louisville, Kentucky.

Lower lakes.—From 0.93 at Buffalo, New York, to 1.07 at Detroit, Michigan, and Rochester New York.

Upper lakes.—From 1.09 at Grand Haven, Michigan, to 1.35 at Mackinac City, Michigan.

Extreme northwest.—From 1.21 at Fort Stevenson, Dakota and Moorhead, Minnesota, to 1.26 at Saint Vincent, Minnesota.

Upper Mississippi valley.—From 1.09 at Saint Louis, Missouri, and Keokuk, Iowa, to 1.23 at La Crosse, Wisconsin.

Missouri valley.—From 0.96 at Springfield, Missouri, to 1.22 at Huron, Dakota.

Northern slope.—From 0.78 at Helena, Montana, to 1.19 at Fort Keogh, Montana.

Middle slope.—From 0.91 at West Las Animas, Colorado, to 0.94 at Fort Elliott, Texas.

Southern slope.—From 0.48 at Fort Davis, Texas, to 0.97 at Fort Sill, Indian Territory.

Southern plateau.—From 0.59 at Tucson, Arizona, to 0.77 at Camp Thomas, Arizona.

Middle plateau.—From 0.84 at Pioche, Nevada, to 0.95 at Salt Lake City, Utah.

Northern plateau.—From 0.87 at Eagle Rock, Idaho, and Fort Missoula, Montana, to 1.22 at Umatilla, Oregon.

North Pacific.—From 0.90 at Roseburg, Oregon, to 1.20 at Olympia, Washington Territory.

Middle Pacific.—From 0.73 at Sacramento, California, to 0.82 at San Francisco, California.

South Pacific.—From 0.67 at Los Angeles, California, to 0.77 at Visalia, California.

AREAS OF HIGH PRESSURE.

There are described twelve areas of high barometer; six first made their appearance from the north of Dakota; one from the north of Montana; two in Washington Territory; two in California.

Three passed eastward over the lake region, affecting only the northern portion of the United States east of Montana.

Two of those from Dakota and Montana, after moving south and east over the Ohio valley, passed off the middle Atlantic coast. From the Pacific coast, two crossed the entire country, one disappearing off the North Carolina coast and the other beyond New England. Four produced northers along the western Gulf coast; two of the latter extended east beyond Florida.

I.—On the morning of the 1st, the pressure was high in Idaho, in western Dakota, and from Kansas to northern Texas, being from 0.3 to 0.4 above the normal. The temperature was below zero in those regions, excepting that it was below freezing over the interior of Texas and slightly above freezing along the Texas coast. A norther prevailed on the coast of Texas and Louisiana, for which off-shore signals were displayed. Maximum hourly wind velocities reported were: Indianola, n. 38; Galveston, n. 37; Port Eads, ne. 24 miles. During the 1st and 2d, the area of high pressure moved eastward, and by midnight of the latter date was central off the middle Atlantic coast.

II.—During the 2d, this high-pressure area advanced south-eastward over Montana and Dakota, in rear of low pressure ii. By morning of the 3d, its centre was still north of Dakota; at Fort Buford the barometer was 0.51 above the normal; the temperature was 30° and more below zero in the northern portions of Dakota and Minnesota; at Fort Garry, —40°. Its progress was south and eastward during the day; at Duluth the barometer was 0.58 above the normal at the 11 p. m. observation. On the 4th, it passed eastward over the lake region, but with the highest pressure to the northward; at Ottawa, the reading of the barometer reduced to sea-level was 30.71, or 0.58 above the normal. On the 5th, it crossed the Saint Lawrence valley, but with diminishing pressure, and over the mouth of the Saint Lawrence northwest gales prevailed. It was apparently dissipated on the 6th and 7th, over Maine, New Brunswick, and Nova Scotia, with low pressure ii. in its advance and iii. in its rear.

III., IV., V.—The pressure increased in California on the 4th and 5th, while low pressure iii. was passing eastward north of Washington Territory and Montana. At Red Bluff, California, it reached its maximum on the morning of the 6th, —30.50, or 0.34 above the normal. High area iii. apparently moved north-eastward, and on the 7th, was central over Washington Territory and Oregon. At Umatilla, the afternoon reduced barometer reading was 30.67, or 0.52 above the normal. At the same time a second high area (iv.) advanced southeastward over Dakota on the 6th and 7th. By morning of the 8th, the entire region from the Pacific coast to Texas, and the upper Mississippi valley, was covered by high pressure, cold, and very generally clear weather. During the night of the 7th, a severe norther began in Texas, which gradually extended east along the Gulf and reached eastern and southern Florida by afternoon of the 9th. Maximum hourly wind velocities: Indianola, n., 59; Galveston, n., 48; Port Eads, nw., 32; Punta Rassa, nw., 44; Key West, nw., 34 miles. At Salt Lake City, the reduced barometer was 30.72, or 0.5 above the normal. During the day, the center continued nearly stationary over Nevada and Utah, with high pressure and generally clear weather over the plateau regions from the Sierra Nevadas to the Rocky mountain slope. These conditions continued on the 9th and 10th. During the afternoon of the 10th, a third high-pressure area of small extent (v.) advanced southeast over Dakota. The two combined, and during the 11th, progressed southeast in advance of low pressure vii. toward the Atlantic coast. By midnight of the 12th, it was central on the North Carolina coast; barometer, 30.64, or 0.46 above the normal. Freezing temperatures were reported in the morning from the northern half of Florida. During the 13th, it passed to the eastward off the coast.

VI.—This appeared on the north Pacific coast during the night of the 11th, and extended eastward to Montana on the 12th. During the 13th, it moved southeastward across the plateau and Rocky mountain regions. At 7.00 a.m. of the 14th, it covered the country from the Missouri and upper Mississippi valleys to northeastern Texas, being central between Saint

Louis and Cairo. During the 14th, 15th, 16th, and 17th, it slowly withdrew northeastward over the Ohio valley, middle Atlantic states, and New England, in advance of low pressure viii. In connection with a slight depression in the Gulf of Mexico it produced a severe norther along the west Gulf coast on the 13th. Maximum hourly velocities reported are: Indianola, n. 41; Galveston, n. 45; Port Eads, n. 32 miles.

VII., VIII., IX.—On the 16th, high area vii. advanced south-eastward over the country north of Montana. During the 17th and 18th, the pressure continued increasing from the north Pacific coast to the upper Mississippi valley with very cold weather, and extended its influence on the 18th to the Saint Lawrence valley. During the 19th and 20th, the latter passed eastward over the Gulf of Saint Lawrence as a separate area, (viii.) On the morning of the 19th, the reduced barometer at Umatilla, Oregon, was 30.91, or 0.75 above normal. From eastern Washington Territory east and southeast to western Minnesota, Nebraska, western Kansas, and Colorado, the temperature fell to more than 20° below zero, and in the northern portion of that region to more than 30° below. During the day it developed into two distinct areas, one (vii.) over the Missouri valley and the other (ix.) over the north Pacific coast region. On the 20th, the former moved south to Texas, while the latter remained nearly stationary. In the morning, zero temperatures occurred as far south as northern Texas and the northern half of Arizona. A severe norther was produced in Texas on the 19th and 20th, with sleet and snow. During the evening of the 20th, the norther reached Port Eads, and by night of the 22d, it was felt at Key West. Maximum velocities: Indianola, n. 40; Galveston, n. 35; Port Eads, n. 35; Key West, ne. 33 miles. During the 20th and 21st a slight depression, which had apparently formed over Arizona and New Mexico the preceding day accompanied by light snows and rains, passed northeastward toward the upper lake region and lost its identity in the extensive low-pressure area (xi.) then crossing the lake region. On the morning of the 22d, the whole of the United States, excepting northern New England, was covered by high pressure—highest, vii., being central near Cairo, 30.75, or 0.54 above the normal, and ix., near Umatilla, Oregon, 30.68, or 0.53 above the normal. Excepting the south Atlantic, east Gulf, and California coasts, the temperature was below freezing; from the lake region to Kansas and northern Nevada it was below zero, while in the northern portions of Minnesota and Dakota it was more than 30° below zero. The above conditions generally continued on the 22d and 23d, excepting that the temperature rose in the northern portions of the country during the progress of low pressure xii. High northwesterly winds and gales prevailed the night of the 21st and to the 23d from the New Jersey coast to Cape Hatteras. On the 24th, viii. passed eastward off the middle Atlantic coast, while ix. moved southeastward over the plateau regions toward New Mexico, and was apparently dissipated there in advance of low pressure xiii.

X.—The observations in Manitoba and Dakota on the morning of the 24th, indicated the approach of a cold wave. By midnight, the reduced barometer reading at Moorhead, Minnesota, was 30.70, or 0.51 above the normal. The a. m. minimum temperatures of the 25th, in the Red River of the North valley, were from 30° to 40° below zero. During the day, the centre moved eastward across the upper lake region toward the Saint Lawrence valley. High northerly winds were produced at night on the coast from Rhode Island to North Carolina. The 26th it disappeared eastward over New England with diminished central pressure and cold clear weather.

XI.—The 26th and 27th, the pressure gradually increased over northern California, and extended its influence eastward over the plateau regions. By the afternoon of the latter date, it was central over Nevada, with reduced barometer readings above 30.40. On the 28th, it continued to cover the country from California to Utah and New Mexico. During the progress southeastward of low pressure xv. on the 29th, this high area withdrew toward California. The p. m. barometer at Red

Bluff was 30.53, or 0.37 above the normal. The 30th, it continued central over northern California, and was dissipated on the 31st.

XII.—This high pressure was observed approaching Montana and Dakota from the northward on the 30th. Its influence extended southeastward over the Missouri and upper Mississippi valleys during the 31st. At the midnight observation, the barometer at Fort Buford was 30.61, or 0.44 above the normal, with the central highest pressure to the north of it.

AREAS OF LOW PRESSURE.

Below are described sixteen areas of low pressure, but two (iii. and iv.) have not been charted on account of the depressions having been slight, and the uncertainty as to the location of their centres on the tri-daily weather maps. The small circles on the tracks, as shown on chart i., give the locations of the centres; the figures above them are dates of the month; the figures below them, 1, 2, and 3, represent respectively 7 a. m., 3 p. m., and 11 p. m., Washington time.

The following table shows the latitude and longitude in which each depression, excepting iii. and iv., were first and last observed, and the hourly velocity of each depression while within the limits of the stations of observation:—

Areas of low barometer.	FIRST OBSERVED.		LAST OBSERVED.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
No. I.	37 45	123 30	32 30	118 00	* 17.2
II.	44 00	103 00	47 30	68 30	40.1
V.	46 15	101 30	40 30	61 00	46.4
VI.	49 15	121 30	33 00	78 00	61.5
VII.	29 00	87 00	45 00	59 15	37.1
VIII.	49 00	98 15	38 00	73 45	32.3
IX.	50 00	121 00	50 00	60 00	35.5
X.	34 30	113 30	46 30	59 30	44.4
XI.	47 15	117 15	50 15	62 00	37.9
XII.	35 15	113 30	35 30	106 30	16.7
XIII.	47 00	97 45	44 45	64 30	53.1
XIV.	45 30	126 00	46 00	82 00	41.9
XV.	30 00	96 15	44 30	61 00	57.5
XVI.	55 15	123 30	47 00	87 00	36.2
Mean hourly velocity.....					39.8

To show the number of areas of low pressure which have occurred during the month of January, since 1874, the following table has been prepared:—

Month.	Year.	Number.	Month.	Year.	Number.
January.....	1874	8	January.....	1879	15
Do.....	1875	12	Do.....	1880	18
Do.....	1876	12	Do.....	1881	9
Do.....	1877	14	Do.....	1882	14
Do.....	1878	12	Do.....	1883	16

I.—During the afternoon of December 31, 1882, rapidly falling barometer, with easterly winds and light snow at San Francisco, indicated the approach of a disturbance from the Pacific ocean. Later the temperature rose and the snow changed to rain. The latter extended to the interior. By morning of January 1, 1883, the centre was off San Francisco. As the storm moved southward along the coast, light rains prevailed nearly to the southern portion of California on the 1st. On the 2d, they were heavier in the southern portion of that state, and extended into Arizona on the night of the 2d and the 3d. The pressure diminished between the Pacific coast and the Rocky mountains during the night of the 1st and on the 2d, and probably resulted in the development of the succeeding disturbance.

II.—This was a minor depression, that apparently developed in Wyoming and southern Dakota, and rapidly passed over the upper lake region and Saint Lawrence valley to the Gulf of Saint Lawrence. It was occasionally accompanied by light snow and high winds, especially in its western half. Cautionary signals were ordered for lake Michigan on the 2d. Maximum hourly wind velocities: Grand Haven, sw., 34; Buffalo, sw., 42 miles; mouth of the Saint Lawrence, nw., gale; Mount

Washington, (violent hurricane, nw., 152 miles, during evening of the 3d, when the anemometer was broken off at the dial.

III.—This slight depression has not been charted. It appeared on the Texas coast on the 3d, with rains, thence to Kentucky, southern Missouri, and Kansas. On the 4th, the depression reached from the Ohio valley south to the Gulf. Rain, generally light, fell throughout the southern states; snow or sleet, from the middle Atlantic coast to the lakes and Missouri valley, and from the last district to Indian Territory. During the 5th, cloudy weather, with light rains, continued from the Gulf to the Ohio valley, but with snow in the lake region, middle states, and New England. The charts giving the deviations from the normal pressures show that this low pressure, also iv., apparently resulted and developed from a general low, covering the plateau regions for several days previous; iii. lost its identity over the upper Ohio valley on the 5th.

IV.—This depression has not been charted. It appeared on the Texas coast on the 5th. Cloudy and rainy weather prevailed on the 6th, in the southern states; snow, changing to sleet and rain in the middle Atlantic states, and snow in New England. The depression passed northeastward to the middle Atlantic coast and disappeared in the general low, the centre of which (v.) was then crossing the lake region.

V.—On the 4th, falling barometer, threatening and rainy weather prevailed over the north Pacific coast region, with snow at night in the interior. The central depression rapidly passed eastward, but at some distance north of the limit of the stations on the 5th. Light rains, and at places brisk to high winds, accompanied it from the north Pacific coast and northern Nevada to Dakota, the precipitation being in the form of snow in the latter. The 6th, it crossed the upper lake region accompanied by occasional light snows and high winds. During the 7th, it moved very quickly to the Gulf of Saint Lawrence, with light snows, from Michigan eastward. From Lake Michigan to the lower lakes, high southwest veering to north-west winds occurred.

VI.—After the movement east of the preceeding storm, rainy weather continued during the night of the 5th and on the 6th along the north Pacific coast, with snow during the latter date, thence east over Montana; at Portland, Oregon, 6.87 inches of rain fell within twenty-four hours. By night of the latter date, the centre had progressed southeastward to western Montana. During the 7th, its movement southeastward to the west Gulf states was exceedingly rapid, probably due to the conditions then prevailing, the pressure being below the normal over the entire country from the Mississippi valley to the Gulf and Atlantic coasts, and above the normal along the Pacific coast, with high-pressure area iv. over Montana and Dakota. Light snows accompanied it from Montana and Dakota to Utah, New Mexico, Kansas, Missouri, and Illinois. During the 8th and 9th, its progress to the south Atlantic coast and thence northeastward was unimportant. Generally cloudy weather accompanied it, with occasionally light rains in the the southern states, but with sleet changing to light snows, thence northeastward to the lower lakes, New England, and Nova Scotia.

VII.—After the preceding depression had passed northeastward, the pressure continued below the normal along the eastern Gulf coast, with a severe norther along the west Gulf states. By the morning of the 9th, low pressure vii. had fully developed and was central in northern Florida. As it moved northeast along the coast with high pressure v. in front of it, the barometric gradient became very steep, resulting in severe northeast gales from Hatteras to Cape Cod on the 9th. Heavy rains fell from Florida to eastern North Carolina, and snow from northern Alabama to New Jersey and Long Island. During the 10th, the snow and northeast gales preceded it along the coast to Nova Scotia, and clearing weather followed it in the south Atlantic states. In the morning, cautionary signals were ordered to be hoisted on the North Carolina coast; in the afternoon, as far north as the coast of Massachusetts, and at night, for the Maine coast. They were fully justified

by the following maximum hourly wind velocities: Hatteras, ne. 42; Kittyhawk, ne. 44; Cape Henry, ne. 52; Delaware Breakwater, Barnegat, and Block Island, ne. 52; Thatcher's Island, ne. 46; Eastport, ne. 32 miles.

VIII.—The approach of this snow-storm from the region to the northward was indicated on the afternoon of the 8th by rapidly falling barometer in Montana and Dakota. In the northern and central portions of the former, high southwest winds increased to gales—at Fort Assiniboine to 52, and Fort Shaw to 58 miles per hour—owing to steep gradients to the southwestward. During the 9th, the centre moved southeast into Wisconsin, with snow from Minnesota and eastern Dakota to Illinois and Missouri. High northwest winds and gales accompanied it on its western side from Montana, Dakota, and Minnesota, south to Kansas. The p. m. barometer at Saint Vincent read 0.69 below the normal, with steep gradients west and southwest. On the 10th and 11th, it passed over the upper Ohio valley and middle Atlantic coast, with no dangerous winds along the latter. Cloudy weather with generally light snow accompanied it from the lakes as far south as Tennessee.

IX.—On the 10th, the pressure began diminishing over the north Pacific coast region and eastward to Montana. During the 11th, the storm-centre advanced southeast to western Dakota. Scarcely any precipitation was produced, but from Montana to eastern portions of Washington Territory and Oregon high westerly winds, and at places severe and destructive gales, accompanied it—at Fort Maginnis, nw., 80 miles. By morning of the 12th, it appeared as a great barometric trough, reaching from Manitoba south beyond western Texas, and central near Fort Bennett, Dakota, where the reduced barometer was 29.44, or 0.76 below normal. During that day, the barometric gradient became steep. In its eastern half, the southerly winds increased to high and at places to gales, with rainy weather at night from eastern Texas northward, and changing over the upper lake region to snow. In its western half, high northwesterly winds and gales prevailed, with snow north of Kansas. On the 13th, it changed its course northeastward. The rain-area extended east over the Gulf states and northeast to the New England coast; to the northward snow fell. Along the Atlantic coast from New Jersey north, in the Saint Lawrence valley, and over the lake region, high southwesterly winds and gales prevailed, but shifted to northwesterly in the latter section. In connection with high-pressure area vi. quite a severe norther was produced along the west Gulf coast. The 14th, clearing weather followed it, with diminishing westerly winds over the lake region, brisk to high northwest winds along the New England and New Jersey coasts, and high north to northeast winds along the Virginia coast and southward to Hatteras. Cautionary signals were ordered for Lake Michigan and the Texas coast on the morning of the 12th; from Port Eads to Pensacola in the afternoon; from North Carolina to Massachusetts at midnight; for the coast of Maine on the morning of the 13th. All were fully justified, except for the North Carolina coast. Maximum hourly velocities: Milwaukee, se., 47; Duluth, nw., 44; Toledo, w., 38; Buffalo, s., 38; Grand Haven, sw., 44; Indianola, n., 41; Galveston, n., 45; Hatteras, sw., 30; Cape May, s. 34; Block Island, sw., 32; Thatcher's Island, sw., 44; Eastport, s., 32; Mount Washington, sw., 100 miles.

X.—On the 13th and 14th, the pressure decreased slightly below the normal in the plateau districts, being lowest over the southern plateau. Light rains fell along the north Pacific coast, and light snows over the interior toward Montana and northern Utah and in New Mexico. During the 15th, the centre passed eastward from Arizona. Threatening and cold rainy weather prevailed from the western Gulf coast to Tennessee, Arkansas, and southern Indian Territory; thence north to lake Michigan and the upper Mississippi valley, numerous light snows, from New Mexico and Arizona to southern Nevada occasional light snows. On the 16th, the rain-area covered the southern states, changing to snow from the upper lakes south-

west to Nebraska and Kansas. As yet no dangerous winds accompanied it, except that in connection with high area vi., then passing off the New England coast, high northeast winds and heavy sea occurred in the vicinity of Cape Hatteras. On the 17th, the rain extended to the Ohio valley and southern New England, and heavy snow to the north and eastward, with increasing winds from the lakes and New Jersey northeastward. The central pressure reached its minimum at Halifax, Nova Scotia, at 7 a. m., of the 18th, being 29.36, or 0.64 below the normal. On the morning of the 17th, cautionary signals were ordered from Chincoteague, Virginia, to Sandy Hook; at midnight they were changed to off-shore, and off-shore signals ordered for the entire New England coast; all were well justified.

XI., XII.—During the afternoon of the 16th, xi. passed south-eastward over eastern Washington Territory, with light rains along the north Pacific coast, but with snow over the interior to Montana and northern portions of Utah and Nevada. On the 17th, it rapidly moved toward New Mexico, probably due to the pressure having been below the normal in that direction, with high pressure along the California coast, and from Dakota and Montana northward. Cloudy weather, with generally light snows prevailed from the upper Missouri valley to Nevada and Utah. The 3 p. m. barometer at Salt Lake City was 29.80, or 0.42 below the normal. During the 18th, threatening and rainy weather, with thunder-storms at places, continued over the southern states; snow from Kansas to the Missouri valley. The centre crossed Texas, and upon reaching the Gulf evidently received new energy. The 19th, a secondary depression (xii.) developed in the upper Mississippi valley and passed northeastward over the upper Lake region beyond the limits of the stations, accompanied by frequent snows and brisk to high winds. In the southern and middle Atlantic states rainy weather prevailed changing to sleet or snow over the interior of Texas, with thunder-storms in the Gulf states; snow from southern New England to the lower lakes. By the afternoon of the 20th, it appeared on the weather chart as an elongated depression reaching the mouth of the Mississippi beyond Lake Huron, with the centre at Toledo; midnight barometer at Parry sound, 29.24, or 0.8 below the normal. Threatening and rainy weather was general from the Mississippi valley eastward, except that it turned to snow or sleet in northern New England, the lake region, and from southern Minnesota to Texas and northern Louisiana. The severe norther produced on the Gulf coast has been mentioned in describing high pressure vii. During this and the following day, high winds and frequent gales prevailed over the lakes; also at places on the Atlantic coast, from Cape Hatteras north. On the morning of the 19th, cautionary signals were ordered for Cape Henry and Kittyhawk, and continued "up" thence to Sandy Hook; on the afternoon of the 20th, they were ordered hoisted from New York to Maine; on the morning of the 21st, off-shore at Hatteras. The signals were changed to off-shore on the 21st. All were fully justified. Maximum hourly velocities: Galveston, n., 45; Kittyhawk, ne., 39; Cape May, nw., 46; Barnegat, nw., 44; Provincetown, se., 36; Thatcher's Island, w., 40; Eastport, se., 32; Mount Washington, se., 114, and w., 116; Oswego, w. 45; Buffalo, w. 50; Cleveland, nw., 40; Grand Haven, w., 36 miles.

XII.—The preceding storm left the pressure below the normal from Nevada southeast to New Mexico on the 18th. The 19th, xii. developed over Arizona and New Mexico, causing light rains in the southern portion of that section; snow over the northern portion, and eastward to Nebraska, Kansas, and Indian Territory. On the 20th, a slight depression appeared in northern Montana, and the two formed a shallow barometric trough reaching from New Mexico to Dakota, in which light snows occasionally fell, and in its western half, high westerly winds occurred. At night and the following day it passed into the general low pressure, (xi.) then existing over the lake region.

XIII.—This disturbance, in its quick movement eastward,

produced numerous light snows and occasionally high winds from eastern Montana to the lakes, northern New England, and the Canadian Maritime Provinces. Cautionary signals were ordered on the afternoon of the 24th along the New Jersey coast and generally justified. Maximum wind velocities, s. 34 miles at Cape May, and nw. 100 miles on Mount Washington.

XIV., XV.—On the 23d, this storm was first felt at Cape Mendocino, California, where a se. gale began blowing, with rain at night, thence north along the coast. During the 24th, the pressure rapidly decreased along the north Pacific coast, with rainy weather, and as far south as beyond San Francisco. At Cape Mendocino, the wind increased to hurricane velocity, being 76 miles per hour at 11 a. m., when the anemometer cups were blown away. During the night a heavy gale prevailed at Astoria, Oregon. At a. m. of the 25th, the barometer at Olympia read 29.46, or 0.56 below the normal, and during the day the rain-area extended eastward over the interior partly as snow as far as Utah, Idaho, and western Montana, with high westerly winds at places. The movement of the storm-centre was north of the limit of the stations. The 26th, rainy weather continued along the north Pacific coast and extended as occasional light rain, changing to snow, thence eastward over the upper Missouri and upper Mississippi valleys to the upper lake region and Lake Erie, with high southerly winds at places on the eastern side of the low. On the 27th, the centre disappeared northeast into Canada, accompanied by light rain or snow and occasionally by high westerly winds from the lakes eastward beyond New England; southward to the Gulf, threatening and rainy weather prevailed, with a shallow barometric trough extending from the lakes to eastern Texas. It was in the latter that the low, xv., developed. During the 28th, cloudy and rainy weather continued in the southern states, Ohio valley, middle Atlantic states and southern New England. Dangerous winds were reported from a few scattered stations. Cautionary signals were ordered on the morning of the 27th from Chincoteague, Virginia, to Eastport, Maine. Maximum velocities: Provincetown, s. 26; Thatcher's Island, s. 35 miles.

XVI.—On the 28th, this low pressure was accompanied by rain from the north Pacific coast to western Montana; at Cape Medocino, Cal., a southeast gale prevailed in the afternoon. By the afternoon of the 29th, the centre was near Bismarek, Dakota—barometer 29.42, or 0.71 below the normal. In its northeast and northwest quadrants snow accompanied it; in its southwest quadrant, rain. In its western half, the gradient was steep, resulting in high northwest winds or gales. On the 30th, its course was northeastward. North and west of the Ohio valley snow fell, with high northwesterly winds and gales, which conditions continued on the 31st. The midnight barometer at Marquette was 29.30, or 0.76 below the normal. During the 31st, high southerly shifting to westerly winds and gales occurred along the middle Atlantic and New England coasts. At midnight of the 30th, cautionary signals were ordered up from Chincoteague, Virginia, to Boston, and on the morning of the 31st, for stations northeast of Boston, and fully justified. Maximum velocities: Delaware Breakwater, se. 32; Barnegat, se. 35; New York City, e. 36; Block Island, se. 36; Provincetown, se. 48; Portland, se. 46; Eastport, se. 43; Mount Washington, s. 110 miles.

NORTH ATLANTIC STORMS DURING JANUARY, 1883.

[Pressure in inches and millimeters; wind-force by Beaufort scale, 0 to 12.]

Chart ii. exhibits the tracks of the principal storms that have occurred over the north Atlantic ocean during January, 1883. The positions of the various storm-centres have been approximately determined from reports of observations furnished by agents and captains of ocean steamships and sailing vessels in the north Atlantic, and from other miscellaneous data received at this office up to January, 24th.

The observations used are, in general, simultaneous, having been taken each day at 7 h. 0 m. a. m., Washington, or 12 h. 8 m. Greenwich time.

The weather of January, 1883, over the north Atlantic was, in general, stormy, the month being characterized by strong westerly gales, and heavy precipitation.

The following notes concern the storms above mentioned:

I.—At the close of December, 1882, an extensive atmospheric depression occupied the north Atlantic, extending from the Banks of Newfoundland eastward to the shores of the British Isles. By the 2d of January, 1883, a recovery had set in to the westward, and the centre of least pressure appeared east of the fortieth degree of west longitude, and north of the fiftieth parallel. On the 2d, the s. s. "Salerno," in N. 48° 51', W. 35° 21', reported barometer 28.36 (745.7), wind nw., force 7, weather squally, with rain. Captain Wilson, of the "Salerno," also reported having encountered very heavy westerly gales, during the period from the 1st to the 8th, the barometer fluctuating very much. On the 3d, the storm-centre was near N. 51°, W. 25°, the s. s. "Bothnia," in N. 49° 59', W. 25° 35', reporting barometer 28.89 (733.8), wind nw., force 9, heavy sea, weather showery; the s. s. "Pavonia," in N. 50° 21', W. 23° 22', also reported wind and sea gradually hauling from south to westward, southerly wind of force 11, shifting to westerly of force 10, barometer 28.60 (726.4). By the morning of the 4th, the centre of disturbance, having moved slowly northeastward, was near N. 52°, W. 24°. The s. s. "Rhynland," near N. 50° 10', W. 24° 00', reported as follows: "At 7 a. m., Greenwich mean time, wind hauled from sw. to se., and sse., blowing a gale; dark and rainy weather, barometer falling rapidly to 28.63 (727.2) at noon. At about 2.00 p. m., Greenwich mean time, a sudden and brief calm occurred, after which the wind suddenly broke out in a very strong gale, with hurricane-like squalls from w. and wnw., followed by rain and sleet; the barometer began to rise quickly and at 7.00 p. m., Greenwich mean time, it read 29.11 (739.4)." The s. s. "Hermol," in N. 49° 20', W. 25° 22', reported: 1 a. m., barometer 29.20 (741.7), wind s., strong gale with heavy showers; 4 a. m., barometer 28.80 (731.5), heavy rain, strong southerly wind; 8 a. m., barometer 28.62 (726.9) heavy rain, but light wind with a very dark sky; at 8.30 a. m. the wind suddenly shifted to west by north, and blew a very strong gale, barometer rising. The s. s. "Abyssinia," N. 50° 09', W. 25° 37', noon, ship running before a violent storm with squalls of hurricane force; 2.00 p. m., wind south and veering to west; rounded the ship to the wind on the starboard tack, head to the southward; 4.00 p. m., wind sw., gale moderating slightly but with violent squalls, sea veering with the wind; 8.00 p. m., wind w. by n., gale again increased to a violent storm with terrific squalls and a very high sea. On the 5th, the disturbance moved to the northward, at some distance from the Irish coast, causing southerly winds and rain over Ireland. The s. s. "Indiana," in N. 51° 31', W. 17° 09', reported barometer 28.64 (727.4), wind se., force 9, rainy.

II.—This is probably a continuation of the storm, traced as low area ii., chart 1 of this REVIEW. On the 3d, the depression was central over the Gulf of Saint Lawrence, whence it moved northeastward over the northern part of New Foundland. On the 4th, this disturbance was shown near N. 51°, W. 45°, the s. s. "Polynesian," in N. 49° 48', W. 44° 57', reporting barometer, 29.33 (745.0), wind sw. by s., force 9, hail and snow. On the 5th, the depression, moving eastward was shown near N. 51°, W. 39°. The s. s. "Lake Huron," in N. 48° 28', W. 36° 10', reported barometer 28.94 (735.1), violent wsw., gale with high dangerous sea and thick snow-squalls; much lightning observed to the westward during the gale. On the 6th, the storm-centre was near N. 52°, W. 31°, attended by strong gales and higher temperature in the eastern quadrants; the disturbance appears to have assumed the form of an elliptical area, as nearly all vessels near the fiftieth parallel, and between the twentieth and fortieth meridians, reported pressures of about 29.40 (746.7). On the 8th, the region of least pressure was near N. 52°, W. 20°, the s. s. "Lake Huron," in N. 50° 52', W. 17° 04', reported barometer 29.22 (742.2); at 4.00 a. m.,

the wind suddenly shifted to se. by e., and blew a strong gale, accompanied by heavy rain. During the 8th, the course apparently changed to the southeastward, and the region of least pressure appeared on the 9th near N. 47°, W. 16°. The bark "Johanne," in N. 46° 04', W. 15° 20', reported barometer 28.70 (729.0), wind e. by n., force 8. On the 10th, the disturbance was central southwest of Brest, and near the entrance to the English Channel, causing strong southeasterly gales and rain in the western part of France and southern part of England.

III.—This is probably a continuation of low area v. of chart i., and was central over the Gulf of Saint Lawrence on the 7th. It apparently increased in energy when near the Banks of Newfoundland, and on the 8th, was central near N. 45°, W. 49°; the s. s. "Salerno," reporting barometer 29.59 (751.6), wind w. by s., force 8, raining. On the 9th, the region of least pressure was transferred to about N. 51°, W. 29°, strong westerly and southwesterly gales were experienced by vessels in the southwestern quadrant of the depression, while moderate southerly winds prevailed to the eastward of the centre. On the 9th, the s. s. "Stella," N. 51° 26', W. 29° 47', reported barometer 29.00 (736.6), wind s., force 2, and on the 10th, this disturbance probably merged in that charted as low area ii.

IV.—This disturbance probably developed near the Madeira islands on the 7th or 8th. Its presence was first felt off Cape Saint Vincent, Spain; Captain Illif, of the s. s. "Amaryllis," reported: between the 8th and 13th, a very heavy gale with high sea was experienced in latitude N. 34° 45', longitude W. 8° to 13°; lowest barometric reading during the gale was 28.90 (734.0) on the 11th. On the 11th, the bark "Woye," in N. 36°, W. 15°, encountered a severe wnw. gale, in which she lost fore and maintop-gallant-masts and split several sails, and on the 12th, the bark "Rosa," in N. 34°, W. 12°, experienced a hurricane, losing lower maintopsail and shifting ballast. Under the influence of this depression and that charted as low area ii., the barometric readings remained low over Spain, the Bay of Biscay and France, during the period from the 8th to the 13th, and strong gales occurred at the entrance to the English Channel and over the Bay of Biscay.

V.—This is a probable continuation of the storm charted as low area vii. of chart i. On the 10th, the depression was central off the coast of the United States; moving somewhat rapidly northeastward, it was south of Newfoundland on the 12th. This storm appears to have moved eastward with unusual rapidity, as on the morning of the 12th, the region of low barometer was near N. 52°, W. 25°, while the barometric pressure had greatly increased over the region west of the thirtieth meridian, where moderate to strong northwesterly gales prevailed. On the 13th, the storm-centre was off the Irish coast, but the wind had apparently diminished in force, as the area of the disturbance increased and extended over western Europe.

VI.—This depression apparently formed near the Bermudas on the 11th; on the 12th, it passed northeastward, and on the 13th, was shown near N. 50°, W. 38°. Captain Nickels of the s. s. "Waesland," in N. 49° 23', W. 34° 04', reported as follows: "At 7.00 a. m., of the 13th, the wind freshened to a sse. gale, with rain, barometer 29.38 (746.2); at 2.00 p. m., barometer 28.59 (726.2) wind hauling to s. by w., force 8, high confused sea flooding decks. At 3.00 p. m., the wind was sw. by s., force 11, and at 4.30 p. m., it increased to force 12, the barometer reading 28.34 (719.8); tremendous sea running and breaking on deck with great force. Terrific squalls of hail and rain followed each other rapidly, and a heavy scud drove with the wind, making it impossible to see any distance. At 6.00 p. m., of the 13th, the barometer began to rise rapidly, and the wind hauled to w. by s., from which point it continued to blow with slowly decreasing force during the ensuing twenty-four hours, dying out in fierce squalls at increasing intervals. During the storm, several boats were stove and displaced, much damage was done about the decks, and several seamen were injured by the sea." The s. s. "Stella," in N. 49° 26', W. 40° 36', also re-

ported barometer 28.98 (736.1), wind nw., force 9, high north-westerly sea. on the 14th, the disturbance, moving northeastward, was central near N. 54°, W. 23°. The s.s. "Scandinavian," in N. 54° 23', W. 20° 58', reported strong se. gale, lowest barometric reading 28.03 (711.9); at 1.33 p. m., heavy gale from s. by w., with high, dangerous sea, wind gradually hauling to westward, ship lying to with engines going slowly; at 5 h. 33 m. p. m., gale occasionally attaining hurricane force; 9.33 p. m., gale moderating, barometer rising, wind w. by s. The barometric gradient was apparently somewhat steep in the southern quadrants of the disturbance, as vessels south of the fifty-first parallel reported pressures of 29.00 (736.6) and above, and westerly and southwesterly gales of force 8 to 9. During the 14th, the storm-centre appears to have moved in a north-northeasterly course, and on the 15th, was off the north-west coast of Ireland. On the following day, the depression was central near the Hebrides, causing rainy weather and decreasing pressures over the Scandinavian peninsula.

VII.—This is a continuation of low area ix of chart i. On the 14th, the disturbance was central near Anticosti island; it passed over Newfoundland and, on the 15th, was apparently central near N. 50°, W. 48°. On that date, the s.s. "Brooklyn," in N. 45° 54', W. 46° 51', reported barometer 29.37 (746.0), wind w. by s., force 8, heavy westerly swell. On the 16th, the disturbance was probably near N. 55°, W. 25°. Captain Park, of the s.s. "Scandinavian," in N. 54° 18', W. 24° 16', reported: day began with moderate gale and unsettled weather, wind varying from se. to sw., and decreasing from force 8 to force 4; at 3 h. 40 m. a. m., weather clearing up, wind sw. by w., force 5, barometer 29.08 (738.6) and falling; at 1.48 p. m., the barometer read 28.89 (733.8), gale increasing rapidly; 5.48 p. m., barometer 28.93 (734.8), heavy wsw. gale of force 11, ship lying to with engines slowed; high dangerous sea; at 9.48 p. m. the gale began to moderate. On the 17th, the disturbance probably united with low area vi., then central to the north of the Hebrides.

VIII.—This is a continuation of the storm described as low area x. of chart i. On the 18th, the depression was central in the Canadian Maritime Provinces; during the day, it moved into the Atlantic, with decreasing pressure at the centre, and on the 19th, it was central as a severe storm near N. 50°, W. 43°. On that date, the s.s. "Frisia," in N. 48° 25', W. 36° 10', encountered a southwesterly gale, of force 6, with heavy sea, barometer reading 28.97 (735.8); s.s. "France," in N. 47° 52', W. 38° 15', reported barometer 29.07 (738.4), wind ssw., force 10, snow and hail. Vessels between 30° and 40° west longitude and between 45° and 50° north latitude, experienced southerly and southwesterly gales of force 10, while to the westward of the fortieth meridian, westerly and north-westerly gales prevailed. The disturbance moved in a north-easterly direction, and on the 20th, was central near N. 54°, W. 32°; the s.s. "Otranto," in N. 51° 46', W. 37° 06', reported barometer 28.60 (726.4), wind w. by s., force 4, shifting afterwards to w. by n., force 9; s.s. "Scandinavian," in N. 50° 03', W. 38° 25', barometer 28.73 (729.7), wind nw., force 10, high sea and showery weather. During the 21st and 22d, the disturbance moved northeastward, and on the 23d, it appeared near N. 56°, W. 15°, causing a decrease of pressure over the British Isles.

IX.—This disturbance was central near the mouth of the Saint Lawrence on the 21st; it moved over the Gulf, and on the following day, was central over the Atlantic, near N. 54°, W. 48°. The lowest barometric reading, 29.13 (739.9), was reported by the s.s. "Otranto," in N. 50° 01', W. 44° 09', wind sw. by s., force 10, cloudy weather and high cross-sea. During the 22d, the depression moved rapidly northeastward, and on the 23d, the region of least pressure was near N. 55°, W. 27°; the s.s. "Bolivia," in N. 54°, 00', W. 25° 16', reported barometer 29.12 (739.6), wind w. by n., force 10, heavy rain and very stormy weather, high and confused sea. During the 24th, the course apparently changed toward the southeast, and on the morning of the 25th, the region of least pressure was off

the southwestern coast of Ireland. This storm moved over the British Isles and the North Sea towards the Scandinavian peninsula, and was very violent during its passage, causing much damage on the coast of the British Isles.

X.—On the 26th, an area of low pressure appeared in mid-ocean, the s.s. "Lord Gough," in N. 50° 12', W. 32° 27', reporting barometer 29.42 (747.3), wind s. by w., force 9, weather threatening. The disturbance moved eastward, and probably on the 27th united with low area ix., then prevailing as a severe storm over the British Isles.

XI.—This depression appeared as a circular area of low pressure near N. 47°, W. 37°, on the last day of the month; its presence is indicated by the following vessel-reports: The s.s. "Landaff City," in N. 47° 54', W. 42° 20', reported: at 3h. 0m. a. m., Greenwich mean time, the wind, having been light and baffling, freshened from the east-southeastward, with heavy rain, and blew for three hours, with force 8; it then shifted to wsw., and at 12h. 0m. it suddenly shifted to ne., and blew with hurricane force for about two hours, after which it moderated to force 8, and hauled to n. During the height of the gale, a thick fog and heavy rain prevailed; barometer 29.40 (746.7). The s.s. "General Werder," in N. 46° 04', W. 42° 10', reported barometer 29.41 (747.0), wind sw. by w., force 9; and the s.s. "Britannic," in N. 49° 22', W. 38° 34', reported barometer 29.45 (748.0), wind ne., force 8, weather threatening. The subsequent track of this storm will probably appear on the chart for February, 1883.

TEMPERATURE OF THE AIR.

[Expressed in degrees, Fahrenheit.]

The distribution of mean temperature over the United States and Canada, for the month of January, 1883, is exhibited on chart iii., by the dotted isothermal lines.

A comparison of the mean temperature of January, 1883, with the means of the corresponding month in previous years, shows the former to have been colder than the average in every section of the country, with the exception of the Florida peninsula and southern California, where the monthly means are 2°.4 and 0°.7 above the normal respectively. In the districts along the Atlantic and Gulf coasts from the Mississippi river to New England, the departures have varied from 0°.8 in the east Gulf states to 2°.7 in the middle Atlantic and New England states. The month has been unusually cold in the central northern part of the country, the region of greatest cold lying between the upper Missouri valley and the upper lake region; there the mean temperature of the month has been more than 11° below the normal, and in the lower Missouri valley and upper lake region, the departures are 9° and 7°.9 respectively. In the other district east of the Rocky mountains, the mean temperatures have varied from 1°.5 below the normal in Tennessee, to 5°.2 below in the northern slope. West of the Rocky mountains, the monthly means are from 0°.4 below the normal in the southern plateau, to 4°.5 below the middle Pacific coast region, and 5°.4 below in the northern plateau. In southern California, there has been a slight increase over the January normal.

The following are some of the extreme monthly mean temperatures reported from Signal Service stations:

Stations reporting highest.	Stations reporting lowest.
Key West, Florida..... 72.3	Saint Vincent, Minnesota..... -13.4
Punta Rassa, Florida..... 66.2	Moorhead, Minnesota..... -9.7
Cedar Keys, Florida..... 58.8	Fort Stevenson, Dakota..... -5.4
Jacksonville, Florida..... 57.9	Fort Buford, Dakota..... -4.5
Laredo, Texas..... 56.7	Bismarck, Dakota..... -2.6
Brownsville, Texas..... 55.4	Pike's Peak, Colorado..... -1.9
Savannah, Georgia..... 54.2	Mt. Washington, New Hampshire... 0.8
Los Angeles, California..... 53.5	Saint Paul, Minnesota..... 1.1
San Diego, California..... 53.4	Huron, Dakota..... 2.9
Yuma, Arizona..... 51.7	Fort Assiniboine, Montana..... 4.9
Charleston, South Carolina..... 51.4	La Crosse, Wisconsin..... 4.9

In the first column of the following table is shown the mean temperature of January in previous years, for the several districts as determined from observations made at the Signal Service stations; the second column shows the mean of

January, 1883; and the third column shows the departures from the January normal.

Average Temperatures for January, 1883.

Districts.	Average for January Signal Service observations.		Comparison of Jan., 1883, with the average for several years.
	For several years.	For 1883.	
New England.....	27.1	24.4	2.7 below.
Middle Atlantic states.....	34.1	31.4	2.7 below.
South Atlantic states.....	47.9	47.0	0.9 below.
Florida peninsula.....	61.3	63.7	2.4 above.
Eastern Gulf.....	50.4	49.6	0.8 below.
Western Gulf.....	48.6	45.0	3.6 below.
Rio Grande valley.....	53.7	51.4	2.3 below.
Tennessee.....	40.9	39.4	1.5 below.
Ohio valley.....	33.3	29.6	3.7 below.
Upper lakes.....	25.3	20.5	4.8 below.
Extreme northwest.....	20.4	12.5	7.9 below.
Upper Mississippi valley.....	5.9	—	5.9 below.
Missouri valley.....	23.2	11.9	11.3 below.
Northern slope.....	20.0	11.0	9.0 below.
Southern slope.....	19.1	13.9	5.2 below.
Northern plateau.....	43.6	39.3	4.3 below.
Middle plateau.....	25.6	20.2	5.4 below.
Southern plateau.....	28.7	26.5	2.2 below.
North Pacific.....	40.0	39.6	0.4 below.
Middle Pacific.....	39.4	37.0	2.4 below.
South Pacific.....	47.7	43.2	4.5 below.
Mount Washington, N. H.....	49.2	49.9	0.7 above.
Pike's Peak, Colo.....	5.8	0.8	5.0 below.
Fort Elliott, Tex.....	3.2	— 1.9	5.1 below.
	33.3	28.0	5.3 below.

DEVIATIONS FROM MEAN TEMPERATURE.

The departures exhibited by the reports from the regular Signal Service stations are shown in the above table of comparative temperatures.

The Chief Signal Officer is indebted to voluntary observers for the following interesting items bearing upon this subject. These comparisons are of special importance, as many of the records from which they are made cover long periods of time, some extending back many years before the establishment of the Signal Service:

California.—The following table, showing the monthly and annual mean temperatures, and the averages by seasons at Sacramento, California, since March, 1853, has been compiled by Sergeant James A. Barwick, Signal Corps, U. S. A. The data used in their preparation from March, 1853, to December, 1874, are from a record kept by Dr. F. M. Logan, and were furnished by Mr. E. F. Smith, Secretary of the State Agricultural Society. The data used from January, 1875, to July, 1877, were obtained from Dr. F. W. Hatch, Secretary of the State Board of Health, and from Mr. S. H. Gerrish, a local observer of Sacramento; and from July, 1877, to December, 1882, the records of the Signal Service have been used. It will be seen that the lowest annual mean temperature was 57° 5 in 1880; the highest was 62° 8 in 1864, and the annual mean of twenty-nine years, 62° 2. The mean temperature of the month of January, 1883, (Signal Service) is 41° 9, or 5° 2 below the January mean of the twenty-nine preceding years.

Table of Mean Temperatures at Sacramento, California.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual means.	Means of spring.	Means of summer.	Means of autumn.	Means of winter.
1853.....	0	0	39.8	61.0	68.0	77.0	75.0	71.0	76.0	78.0	53.0	0	0	62.9	74.3	69.0	62.9
1854.....	43.0	51.0	53.6	60.0	62.0	67.0	80.6	69.5	65.0	60.0	55.0	45.0	59.5	58.3	72.4	60.0	47.3
1855.....	43.7	52.5	54.8	58.1	60.2	71.1	72.5	73.0	68.0	63.0	50.6	47.9	59.5	57.7	72.2	60.5	48.0
1856.....	48.0	52.6	57.0	58.8	63.9	71.1	75.1	69.6	70.9	58.0	52.2	45.0	60.1	59.9	71.9	60.4	48.9
1857.....	48.5	50.2	54.4	63.3	65.5	71.9	71.4	71.3	67.9	61.5	53.2	43.9	60.7	61.7	71.5	60.9	47.5
1858.....	45.0	52.2	53.7	59.8	65.2	69.4	70.8	70.6	68.9	59.5	54.2	47.7	59.5	59.6	70.3	60.9	48.2
1859.....	44.9	50.5	51.5	57.1	63.0	74.8	69.1	67.2	65.9	63.3	54.0	44.5	59.7	57.2	70.4	61.1	46.6
1860.....	46.2	49.8	53.3	57.8	58.5	65.6	73.2	73.5	67.6	59.8	53.5	43.5	59.0	56.5	70.8	60.3	46.5
1861.....	47.1	52.2	55.0	60.6	63.7	66.2	73.6	69.7	67.8	59.9	53.6	49.3	60.1	59.8	69.8	60.4	49.5
1862.....	46.4	47.5	53.6	58.0	61.2	69.3	73.2	75.0	70.4	67.6	53.1	50.9	60.2	57.6	72.5	63.7	48.3
1863.....	46.9	48.0	57.6	59.5	67.1	69.1	75.6	70.7	69.0	62.8	52.7	46.4	60.3	61.4	71.8	61.5	47.1
1864.....	49.2	53.6	56.1	68.1	68.5	71.1	74.8	74.7	69.8	64.5	53.5	46.5	61.8	62.2	73.5	62.6	49.7
1865.....	47.4	49.6	53.6	59.3	70.2	73.5	74.0	71.7	68.8	63.1	56.9	50.2	61.0	61.0	73.1	63.9	48.9
1866.....	46.5	53.5	54.2	61.9	63.1	72.2	76.2	76.0	72.2	65.2	53.8	44.1	61.1	59.7	74.8	63.7	48.0
1867.....	48.2	47.8	50.7	59.7	64.4	70.3	73.2	71.7	68.8	62.7	54.8	50.2	59.9	58.3	71.9	62.1	48.7
1868.....	47.0	50.5	55.0	60.1	64.2	69.5	73.8	71.2	68.3	62.0	53.0	46.8	60.1	59.8	71.5	61.4	48.1
1869.....	47.6	49.9	53.6	59.0	64.2	70.8	74.4	71.3	69.9	63.1	54.0	47.0	61.4	58.9	72.5	62.3	48.2
1870.....	48.6	51.1	53.0	57.0	61.0	69.3	71.8	72.6	68.0	63.6	53.4	46.5	59.6	57.0	71.2	61.7	48.7
1871.....	48.3	49.4	59.0	59.2	61.5	70.1	70.2	72.0	67.4	62.2	59.2	45.5	59.6	58.9	70.8	59.9	47.7
1872.....	48.5	53.3	56.8	57.6	67.0	69.2	71.4	73.1	68.8	58.9	51.2	48.7	60.4	60.5	71.6	59.6	48.2
1873.....	52.7	48.2	52.9	59.5	64.7	70.2	73.2	69.3	69.9	61.4	57.5	49.0	60.7	61.0	70.4	62.9	50.0
1874.....	45.7	49.3	52.9	60.5	64.7	70.2	72.8	70.9	70.7	61.7	53.5	47.7	59.8	59.0	71.3	62.2	47.6
1875.....	46.9	52.7	53.7	63.0	68.1	70.6	73.3	72.5	55.7	69.9	50.7	45.0	62.5	61.6	72.1	60.8	48.2
1876.....	48.8	50.2	54.6	59.5	65.7	76.9	74.0	72.8	70.1	63.3	53.3	48.0	61.7	59.9	74.6	62.3	49.0
1877.....	49.1	55.0	59.0	60.2	64.5	72.5	75.0	72.9	72.5	62.9	54.7	45.5	61.2	61.2	73.5	63.4	49.9
1878.....	49.7	51.3	56.7	59.4	65.3	71.0	73.4	73.4	69.0	62.9	55.5	48.6	61.3	60.2	72.9	62.5	49.9
1879.....	45.5	55.0	57.4	60.3	60.2	72.1	71.8	74.7	70.5	61.3	50.9	47.2	60.3	59.3	72.9	61.0	49.2
1880.....	43.5	46.0	48.8	54.6	61.6	66.6	70.9	69.7	68.0	62.1	49.7	44.0	57.5	53.0	69.1	59.9	44.5
1881.....	49.2	53.5	55.5	60.8	64.5	66.1	71.1	68.2	67.8	56.8	50.8	50.3	59.2	60.4	68.5	58.5	51.0
1882.....	45.1	49.3	53.0	55.8	64.0	68.1	73.4	71.9	68.4	58.4	49.5	46.2	59.4	57.6	71.1	58.8	45.9
Sums.....	1364.8	1472.1	1643.1	1783.0	1929.1	2115.1	2198.7	2148.7	2052.0	1879.8	1608.9	1364.8	1747.1	1784.7	2155.2	1847.2	1401.3
Means.....	47.1	50.8	54.8	59.4	64.3	70.5	73.3	71.6	68.7	62.7	53.6	47.1	60.2	59.5	76.1	61.6	48.3

* Means for the winters from 1852-3 to 1881-2, both inclusive.

† Mean for 11 months.

‡ Mean for 29 years.

Illinois.—Anna, mean temperature 29° 34, or 4° 92 below the January average of the last eight years. During that period, the highest January mean, 49° 0, occurred in 1880; the lowest, 23° 9, occurred in 1875. Riley, mean temperature 8° 2, or 10° 4 below the January average of the last twenty years, and is the lowest monthly mean of that period, with the exception of January, 1875. Swanwick, mean temperature 24° 4, or 10° 6 below the January average. Peoria, mean temperature 15° 1 is the lowest January mean that has occurred during the last twenty-eight years, with the exception of January, 1857, when the mean was 13° 4. Rockford, mean temperature 9° 29 is the lowest mean, with the exception of January, 1875, (6° 55) that has occurred during the last ten years. The next lowest mean temperature was 11° 27, for January, 1881.

Indiana.—Logansport, the mean temperature, 20° 3, is 5° 7

below the January average of twenty-four years. The maximum temperature of January, 1883, is 43°, which is 2° lower than the lowest maximum, and 29° lower than the highest maximum for the period covered by the record; the minimum temperature of January, 1883, is —16°, or 14° degrees higher than the minimum for January, 1873, but is lower than the January minimum of sixteen of the twenty-four years. The greatest range of temperature during January, 90°, occurred in 1864; the least, 47°, occurred in 1863; the range for the entire period during January, is 102°. Vevay, mean temperature, 30° 99, is the January normal of eight years. The maximum temperature, 50°, is 10° below the average maximum of eight years, and the minimum temperature, 1°, is 4° 5 below the average minimum of the same period.

Iowa.—Clinton, mean temperature, 8° 0, or 9° 7 below the

January average, and is the lowest monthly mean temperature of which there is any record during the last twenty years. The minimum temperature of the month, -32° , is the lowest recorded during that period.

Kansas.—Lawrence, mean temperature, $19^{\circ}.65$, or $7^{\circ}.84$ below the January average of the last sixteen years. During that period the highest January mean, $41^{\circ}.23$, occurred in 1880; the lowest, $15^{\circ}.6$, occurred in 1875. The mean temperature of January, 1883, at 7.00 a. m., was $13^{\circ}.5$; at 2 p. m., $26^{\circ}.2$; at 9.00 p. m., $19^{\circ}.5$. Yates Centre, mean temperature, $19^{\circ}.3$, or $8^{\circ}.3$ below the average of last three years. Wellington, mean temperature $23^{\circ}.9$, or $5^{\circ}.7$ below the January average of the last four years.

Maine.—Gardiner, mean temperature, $12^{\circ}.76$, or $5^{\circ}.0$ below the January average of the last forty-seven years. During

that period, the highest January mean, $25^{\circ}.8$, occurred in 1863; the lowest, $7^{\circ}.1$, occurred in 1844.

Maryland.—Sandy Springs, mean temperature, $27^{\circ}.4$, or $4^{\circ}.0$ below the January average of the last sixteen years. Fallston, mean temperature, $26^{\circ}.21$, or $4^{\circ}.13$ below the January average of the last thirteen years. The highest January mean of that period, $40^{\circ}.13$, occurred in 1880; the lowest, $25^{\circ}.05$, occurred in 1881.

Michigan.—Thornville, mean temperature, $16^{\circ}.65$, or about 7° below the January average of many years.

Missouri.—Saint Louis, the Missouri Weather Service reports the mean temperature to be $23^{\circ}.1$, or $8^{\circ}.6$ below the January normal. The record covers a period of forty-six years, during which time, lower January mean temperatures occurred in but three years; viz.: $20^{\circ}.1$ in 1856; $19^{\circ}.3$ in 1857; $21^{\circ}.3$ in 1875.

Table of Comparative Minimum Temperatures for the Month of January.

State or Territory.	Minimum for January, 1883, Signal Service.		Lowest since Signal Service stations were opened—3 to 12 years.			Lowest from any other source.			
	Station.	Temp.	Station.	Temp.	Year.	Place.	Temp.	Year.	Length of Record.
Alabama	Montgomery	0	Montgomery	0	73-'79	Huntsville	-9	1832, '36	9 years
Arizona	Prescott	-8	Prescott	-17	1880	Fort Canby (old)	-20	1850	12
Arkansas	Fort Smith	-2	Little Rock	18	1881	Mount Ida	-10	1878	6
California	Red Bluff	19	Campo	0	1880	Fort Crook	-20	1859	11
Colorado	Pike's Peak	-37	Pike's Peak	-33	1879	Fort Garland	-40	1873	30
Connecticut	New London	2	New Haven	-14	1873	Fort Lyon	-28	1875	22
Dakota	Fort Buford	-48	New London	-14	1873	Colebrook	-25	1861	9
Delaware	Delaware Breakwater	14	Pembina	-53	1877				
Dist. of Columbia	Washington	11	Delaware Breakwater	10	1882				
Florida	Jacksonville	29	Washington	-14	1881	Fort Randall	-44	1875	22
Georgia	Atlanta	14	Saint Marks	18	1879	Fort Delaware	-5	1875	6
Idaho	Eagle Rock	-38	Atlanta	9	1879	Dover	-5	1875	6
Illinois	Chicago	-17	Eagle Rock	-30	1882	Washington	-14	1835	48
Indiana	Indianapolis	-11	Chicago	-18	1879	Fort Barrancas	10	1852	61
Indian Territory	Fort Supply	-12	Indianapolis	-22	1879	Atlanta	3	1873	4
Iowa	Dubuque	-26	Fort Supply	-17	1881	Augusta Arsenal	8	1835	48
Kansas	Leavenworth	-10	Dubuque	-24.5	1881	Fort Lapwai	-33	1875	19
Kentucky	Louisville	8	Leavenworth	-29	1873	Rock Island Arsenal	-29	1873	14
Louisiana	Shreveport	12	Louisville	-10	74-'79	Galesburg	-29	1864	8
Maine	Eastport	-12	Shreveport	6	1879	Arlington, near	-25	1879	2
Maryland	Ocean City	10	Eastport	-20	1874	Spiceland	-23	1879	13
Massachusetts	Boston	-0.5	Baltimore	-6	1881	Fort Gibson	-20	1857	54
Michigan	Alpena	-22	Springfield	-14	1881	Fort Sill	-20	1873	9
Minnesota	Escanaba	-22	Escanaba	-28	1873	Fort Madison, near	-33	1864	18
Mississippi	Saint Vincent	-44	Saint Vincent	-44	1881	Fort Leavenworth	-30	1834	52
Missouri	Starkville	17	Breckenridge	-39	1873	Newport Barracks	-15	1879	29
Montana	Springfield	-5	Vicksburg	10	1875	Baton Rouge	8	1852	52
Nebraska	New Chicago	-47	Saint Louis	-16	1875	Okaloosa	5	1879	3
Nevada	North Platte	-26	Fort Benton	-55	1875	Brunswick	-32	1859	52
New Hampshire	Pioche	-17	Virginia City	-44	1875	Gardiner	-32	1878	41
New Jersey	Mount Washington	-29	North Platte	-27	1881	Fort McHenry	-15	1873	53
New Mexico	Sandy Hook	4	Winnemucca	-14	1879	Williamstown	-30	1835	55
New York	Santa Fé	-13	Mount Washington	-46	1875	Fort Brady	-42	1873	60
North Carolina	Buffalo	-6	Barnegat	-10	1875	Uniontown	-34	1861	11
Ohio	Rochester	-6	Santa Fé	-9	1881	Fort Ripley	-44	1860	17
Oregon	Charlotte	15	Albany	-18	1878				
Pennsylvania	Charlotte	15	Charlotte	11	79-'81	Fayette	7	1879	9
Rhode Island	Sandusky	-11	Kittyhawk	11	1879	Columbus	10	1864	9
South Carolina	Umatilla	-8	Columbus	-20	1879	Ashley	-27	1879	4
Tennessee	Erie	-7	Umatilla	-25	1879	Saint Louis	-19	1835	40
Texas	Point Judith	1	Pittsburg	-12	1875	Fort Benton	-58	1873	13
Utah	Narragansett Pier	1	Newport	-8	1882	Fort Ellis	-53	1872	15
Vermont	Charleston	25	Charleston	19	1873	Camp Sheridan	-30	1881	5
Virginia	Knoxville	1.5	Knoxville	-14	1877	Fort Niobrara	-35	1881	1
Washington	Fort Elliott	-12	Fort Elliott	-6	1881	Fort Ruby	-23	1864	5
West Virginia	Salt Lake City	20	Salt Lake City	0	74-'82	Fort Halleck	-22	1868	13
Wisconsin	Burlington	-25	Burlington	-25	1882	Dartmouth College	-34	1848	17
Wyoming	Lynchburg	8	Fort Myer	-8	1881	Stratford	-33	1861	10
	Spokane Falls	-28	Colfax	-8	1882	Paterson	-13	1866	10
	Morgantown	4	Morgantown	-6	1875	Atco	-24	1881	7
	La Crosse	-30	La Crosse	-43	1873	Burnt Mills	-24	1873	3
	Cheyenne	-31	Cheyenne	-38	1875	Fort Union	-25	1861	31
						Salem	-40	1840	8
						Gouverneur	-38	1835	40
						Murphy	-16	1877	8
						Westerville	-16	1877	7
						Lenoir	-24	1877	8
						Jacksonburg	-25	1879	8
						Marietta	-22	1852	53
						Fort Dallas	-23	1862	10
						Carlisle Barracks	-28	1873	37
						Philadelphia	-9	1860	111
						Providence	-17	1866	35
						Fort Adams	-13	1873	41
						Fort Moultrie	14	1835	38
						Spartanburg	0	1877	3
						Charleston	16	1852	105
						Clarksville	-10	1879	8
						Glenwood Cottage	-8	1864	10
						Fort Davis	-15	1873	28
						Coalville	-30	1875, '77	8
						Woodstock	-38	1878	8
						Lunenburg	-29	1882	16
						Mount Solon	-18	1881	7
						Fort Colville	-33	1875	20
						Helvetia	-14	1879	7
						Embarras	-40	1875	19
						Fort Laramie	-40	1864	29
						Fort Sanders	-61	1875	13

New Hampshire.—Grafton, mean temperature, $12^{\circ}.3$, or $4^{\circ}.7$ below the January average of five years. Contoocookville, mean temperature, $18^{\circ}.1$, or $3^{\circ}.6$ below the January average of the last twelve years.

New York.—Palermo, mean temperature, $14^{\circ}.9$, or $6^{\circ}.7$ below the January average of the last thirty years. The highest January mean of that period, $29^{\circ}.4$, occurred in 1881; the lowest, $12^{\circ}.8$, occurred in 1881. North Volney, mean temperature, $16^{\circ}.92$, or $5^{\circ}.37$ below the January average of the last fifteen years. The highest January mean of that period, $31^{\circ}.8$, occurred in 1880; the lowest, $15^{\circ}.1$, occurred in 1881.

Pennsylvania.—Dyberry, mean temperature, $17^{\circ}.4$, or $3^{\circ}.9$ below the January average of the last nineteen years. The highest monthly mean of that period, $30^{\circ}.7$, occurred in 1880; the lowest, $15^{\circ}.4$, occurred in 1875. The minimum temperature of January, 1883, -20° , occurred on the 24th; the lowest January minimum of a period of twenty-eight years is -32° , and occurred January 30, 1873.

Vermont.—Woodstock, mean temperature, $10^{\circ}.82$, or $5^{\circ}.08$ below the January average of the last sixteen years. The highest January mean of that period was $23^{\circ}.77$, in 1880; the lowest, $5^{\circ}.82$, in 1878. The highest January maximum temperature, 62° , occurred in 1876, and the lowest minimum, -38° , occurred in 1873 and 1878.

Virginia.—Wytheville, mean temperature, $33^{\circ}.8$, or $1^{\circ}.7$ above the January average. Variety Mills, mean temperature, $32^{\circ}.0$, or $4^{\circ}.1$ below the January average of six years. The highest January mean of that period, $44^{\circ}.9$, occurred in 1880; the lowest, $31^{\circ}.0$, occurred in 1881.

West Virginia.—Helvetia, mean temperature, $33^{\circ}.7$, or $0^{\circ}.9$ above the average of the last seven years.

RANGES OF TEMPERATURE AT SIGNAL SERVICE STATIONS.

Over the entire country the monthly ranges of temperature, during January, 1883, have varied from 24° to 94° . The greatest monthly ranges are reported from the northern slope and the extreme northwest, while the least are reported from California and from stations on the south Atlantic and eastern Gulf coasts. The smallest monthly ranges are as follows: San Francisco, California, 24° ; Key West, Florida, 27° ; Hatteras, North Carolina, 34° ; Delaware Breakwater, Delaware, 36° ; Chincoteague, Virginia, 37° ; Ocean City, Maryland, 38° ; Punta Rasa, Florida, 38° ; Baltimore, Maryland, 39° ; Cape May, New Jersey, 39° ; Fort Macon, North Carolina, 39° ; Little Egg Harbor, New Jersey, 39° ; Pensacola, Florida, 39° ; Philadelphia, Pennsylvania, 39° ; Port Eads, Louisiana, 39° ; Cedar Keys, Florida, 40° ; Sacramento, California, 40° . The largest are: Deer Lodge, Montana, 94° ; New Chicago, Montana, 94° ; Fort Buford, Dakota, 91° ; Cartersville, Montana, 90° ; Fort Meade, Dakota, 90° ; Fort Bennett, Dakota, 89° ; Fort Sully, Dakota, 87° ; Cheyenne, Wyoming, 86° ; Fort Benton, Montana, 85° ; Fort Assiniboine, Montana, 84° ; Helena, Montana, 84° ; West Las Animas, Colorado, 83° ; Fort Shaw, Montana, 82° ; Fort Keogh, Montana, 81° ; Terry's Landing, Montana, 81° ; Graham, Texas, 79° ; Moorhead, Minnesota, 79° ; Coleman City, Texas, 78° ; Fort Elliott, Texas, 78° ; Fort Supply, Indian Territory, 78° ; Bismarck, Dakota, 77° ; Fort Custer, Montana, 77° ; Cœur d'Alene, Idaho, 76° ; Dayton, Washington Territory, 76° ; North Platte, Nebraska, 76° ; Pomeroy, Washington Territory, 76° ; Eagle Rock, Idaho, 75° ; Huron, Dakota, 75° ; Spokane Falls, Washington Territory, 75° ; Billings, Montana, 74° ; Fort Lapwai, Idaho, 74° ; Fort Maginnis, Montana, 74° ; Phoenix, Arizona, 74° ; Fort Sill, Indian Territory, 74° ; Fort Stockton, Texas, 74° ; Prescott, Arizona, 73° ; Concho, Texas, 72° ; Pioche, Nevada, 72° ; Henrietta, Texas, 71° ; Fort McKavett, Texas, 70° ; Davenport, Iowa, 69° ; Fort Apache, Arizona, 69° ; Colfax, Washington Territory, 68° ; Omaha, Nebraska, 68° ; Palestine, Texas, 68° ; Fort Verde, Arizona, 68° ; Denison, Texas, 67° ; Salt Lake City, Utah, 67° ; Almoda, Washington Territory, 66° ; Fort Smith, Arkansas, 66° ; Sant Vincent, Minnesota, 66° ; Yankton, Dakota, 66° ; Des Moines, Iowa, 65° ; El Paso, Texas, 65° ; Fredericksburg, Texas, 65° ; Lewiston, Idaho, 65° ; Uvalde, Texas, 65° .

Table of Maximum and Minimum Temperatures for January, 1883.

State or Territory.	Signal Service.			U. S. Army Post Surgeons, or Voluntary Observers.		
	Station.	Max.	Min.	Station.	Max.	Min.
Alabama.....	Montgomery.....	77	25	Mount Vernon Barracks.....	76	24
Do.....	Do.....	Do	Do	Auburn.....	73	19
Arizona.....	Phoenix.....	87	13	Mount Ida.....	65	5
Do.....	Prescott.....	64	8	Ravenna.....	90	18
Arkansas.....	Fort Smith.....	68	2	Fort Bidwell.....	54	-18
Do.....	Little Rock.....	66	12	Fort Collins.....	67	-31
California.....	Los Angeles.....	82	30	Colorado Springs.....	59	-32
Do.....	Red Bluff.....	65	19	Southington.....	45	-7
Colorado.....	West Las Animas.....	62	-22	Fort Stevenson.....	38	-47
Do.....	Pike's Peak.....	21	-37	Distributing Reservoir.....	51	9
Connecticut.....	New Haven.....	47	13	Rock Creek Bridge.....	51	9
Do.....	New London.....	45	2	Mayport.....	82	30
Dakota.....	Fort Meade.....	62	-28	Fort Barrancas.....	76	15
Do.....	Fort Buford.....	45	-46	Quitman.....	80	26
Delaware.....	Del. Breakwater.....	50	14	Forsyth.....	70	18
District of Columbia.....	Washington.....	50	11	Anna.....	52	3
Do.....	Do.....	Do	Do	Elmira.....	33	-34
Florida.....	Key West.....	82	55	Laconia.....	57	0
Do.....	Jacksonville.....	76	29	Fort Wayne.....	45	-18
Georgia.....	Savannah.....	74	27	Fort Reno.....	69	-9
Do.....	Atlanta.....	64	14	Guttenburg.....	34	-38
Idaho.....	Lewiston.....	51	-14	Wellington.....	57	-12
Do.....	Eagle Rock.....	37	-38	Clay Centre.....	59	-31
Illinois.....	Chicago.....	40	-17	Bowling Green.....	52	2
Indiana.....	Indianapolis.....	45	-11	Point Pleasant.....	76	17
Do.....	Do.....	Do	Do	Gardiner.....	38	-17
Indian Territory.....	Fort Sill.....	72	-2.5	Orono.....	41	-25
Do.....	Fort Supply.....	66	-12	Emmitsburg.....	59	-4
Iowa.....	Davenport.....	46	-23	Woodstock.....	43	-2
Do.....	Dubuque.....	35	-20	Williamstown.....	37	-13
Do.....	Des Moines.....	39	-25	Heath.....	40	0
Kansas.....	Leavenworth.....	50	-10	Hastings.....	41	-24
Do.....	Do.....	Do	Do	Minneapolis.....	32	-31
Kentucky.....	New Orleans.....	55	8	Fayette.....	72	22
Louisiana.....	Shreveport.....	77	34	Protem.....	64	1
Do.....	Eastport.....	44	-12	Corning.....	45	-20
Maine.....	Portland.....	44	1	Bedford.....	44	-20
Do.....	Baltimore.....	50	11	Fort Assiniboine.....	42	-43
Maryland.....	Ocean City.....	48	10	Fort Maginnis.....	50	-34
Massachusetts.....	Boston.....	50	-0.5	Lincoln.....	61	-15
Do.....	Do.....	Do	Do	Fort Niobrara.....	45	-34
Michigan.....	Detroit.....	50	-8	Humboldt.....	62	-17
Do.....	Escanaba.....	32	-22	Carlin.....	48	-46
Do.....	Alpena.....	38	-22	Bristol.....	48	-22
Minnesota.....	Saint Vincent.....	22	-44	Pate'son.....	45	0
Do.....	Moorhead.....	37	-42	Fort Union.....	61	-30
Mississippi.....	Starkville.....	71	17	Lordsburg.....	63	13
Missouri.....	Springfield.....	55	-5	White Plains.....	47	-1
Do.....	Do.....	Do	Do	Friendship.....	40	-20
Montana.....	Helena.....	50	-34	Murphy.....	66	3
Do.....	Cartersville.....	50	-40	Highlands.....	57	-6
Do.....	New Chicago.....	47	-47	Portsmouth.....	65	8
Nebraska.....	North Platte.....	50	-20	Westerville.....	51	-10
Do.....	Pioche.....	55	-17	Marion.....	51	-10
Nevada.....	Do.....	Do	Do	Fort Klamath.....	46	-9
New Hampshire.....	Mt. Washington.....	38	-29	Dyberry.....	38	-30
New Jersey.....	Sandy Hook.....	48	4	Germantown.....	46	4
Do.....	Barnegat.....	48	6	Fort Adams.....	42	1
New Mexico.....	Silver City.....	67	8	Aiken.....	69	17
Do.....	Santa Fe.....	53	-13	Austin.....	64	8
New York.....	Buffalo.....	48	6	Fort Concho.....	80	3
Do.....	Rochester.....	44	-6	Terrace.....	50	-20
North Carolina.....	New River.....	69	36	Kelton.....	50	-28
Do.....	Charlotte.....	62	15	Nephi.....	47	-37
Ohio.....	Cincinnati.....	59	6	Woodstock.....	44	-31
Do.....	Sandusky.....	49	-11	Variety Mills.....	57	-5
Oregon.....	Roseburg.....	54	12	Helvetia.....	56	8
Do.....	Umatilla.....	52	-8	Neillsville.....	26	-41
Pennsylvania.....	Pittsburg.....	54	1	Manitowoc.....	37	-22
Do.....	Erie.....	48	-7	Fort Bridger.....	44	-30
Rhode Island.....	Block Island.....	56	6			
Do.....	Point Judith.....	44	1			
Do.....	Narragansett Pier.....	46	1			
South Carolina.....	Charleston.....	69	25			
Tennessee.....	Knoxville.....	70	1.5			
Texas.....	Fort Stockton.....	80	6			
Do.....	Laredo.....	80	23			
Do.....	Fort Elliott.....	66	-12			
Do.....	Coleman City.....	77	-1			
Utah.....	Salt Lake City.....	47	-20			
Do.....	Do.....	Do	Do			
Vermont.....	Do.....	Do	Do			
Virginia.....	Cape Henry.....	67	20			
Do.....	Lynchburg.....	58	8			
Washington.....	Almoda.....	54	-12			
Do.....	Spokane Falls.....	47	-25			
West Virginia.....	Morgantown.....	58	4			
Wisconsin.....	Milwaukee.....	38	-23			
Do.....	La Crosse.....	34	-30			
Wyoming.....	Cheyenne.....	55	-31			

The greatest daily ranges of temperature have varied in the several districts as follows:—

New England.—From 26° at Provincetown, Massachusetts,

on the 13th, to 39° at New Haven, Connecticut, on the 13th, and 51° on the summit of Mount Washington, New Hampshire, on the 21st.

Middle Atlantic states.—From 20° at Baltimore, Maryland, on the 13th, to 34° at Cape Henry, Virginia, on the 21st.

South Atlantic states.—From 20° at Hatteras, North Carolina, on the 13th, and 28th, to 38° at Atlanta, Georgia, on the 21st.

Florida peninsula.—From 14° at Key West, on the 9th, to 24° at Punta Rassa, on the 22d.

Eastern Gulf.—From 23° at New Orleans, Louisiana, on the 21st, to 39° at Mobile, Alabama, on the 21st.

Western Gulf.—From 25° at Port Eads, Louisiana, on the 9th, and 26° at Galveston, Texas, on the 8th, to 43° at Fredericksburg, Texas, on the 22d.

Rio Grande valley.—From 35° at Brownsville, Texas, on the 19th, to 42° at Eagle Pass, Texas, on the 23d.

Ohio valley and Tennessee.—From 28° at Memphis, Tennessee, on the 26th, and 30° at Indianapolis, Indiana, on the 20th and 24th, to 37° at Knoxville, Tennessee, and 40° at Pittsburgh, Pennsylvania, on the 21st.

Lower lakes.—From 26° at Detroit, Michigan, on the 13th, to 44° at Buffalo, New York, on the 21st.

Upper lakes.—From 24° at Mackinac City, Michigan, on the 26th, to 42° at Duluth, Minnesota, on the 19th.

Extreme northwest.—From 37° at Saint Vincent, Minnesota, on the 11th, to 50° at Fort Stevenson, Dakota, on the 8th.

Upper Mississippi valley.—From 34° at La Crosse, Wisconsin, and Springfield, Illinois, on the 19th, and Saint Louis, Missouri, on the 24th, to 59° at Des Moines, Iowa, on the 9th.

Missouri valley.—From 37° at Springfield, Missouri, on the 19th, to 47° at Omaha, Nebraska, and at Yankton, Dakota, on the 9th.

Northern slope.—From 36° at Cheyenne, Wyoming, on the 20th, to 49° at Forts Benton and Shaw, Montana, on the 5th and 22d respectively.

Middle slope.—From 31° on the summit of Pike's Peak Colorado, to 56° at West Las Animas, Colorado, on the 22d.

Southern slope.—From 43° at Fort Sill, Indian Territory, on the 23th, to 51° at Coleman City, Texas, on the 26th, and 52° at Fort Stockton, Texas, on the 25th.

Southern plateau.—From 31° at Santa Fé, New Mexico, on the 21st, and at Fort Grant, Arizona, on the 29th, to 47° at Fort Apache, Arizona, on the 21st.

Middle plateau.—From 24° at Salt Lake City, Utah, on the 20th, to 37° at Pioche, Nevada, on the 21st.

Northern plateau.—From 26° at Umatilla, Oregon, on the 5th, to 44° at Fort Missoula, Montana, on the 9th.

North Pacific.—From 18° at Portland, Oregon, on the 17th, to 24° at Olympia, Washington Territory, on the 18th.

Middle Pacific.—From 14° at San Francisco, California, on the 22d, to 35° at Red Bluff, California, on the 9th.

South Pacific.—From 32° at Visalia, California, on the 23d, to 37° at Los Angeles, California, on the 23d and at Yuma, Arizona, on the 30th.

LOW TEMPERATURES.

California.—San Francisco, 20th: Reports of intensely cold weather are received from points along the Central Pacific railroad; at Elko, Nevada, on the morning of the 19th, the temperature fell to -54°.

Colorado.—Denver, 19th: Minimum temperature -20°, and the mean for the day the lowest ever recorded here; the temperature did not rise above -9°. The following low temperatures were reported from points along the Denver and Rio Grande railroad on the morning of the 20th: Divide, -26°; Marshall Pass, -30°; Gunnison, -40°; Crested Butte, -38°; Leadville, -33°; Tennessee Pass, -35°; Red Cliff, -32°; Robinson, -40°; Frisco, -33°; Cumbres, -25°. The following additional reports were received at the Western Union telegraph office: Rosita, -25°; Central City, -31°; Colorado Springs, -29°; Boreas, -45°; Breckenridge, -40°; mercury froze; Alma, -28°; Boulder, -28°. Leadville, 20th: At 5

a. m. of this date, the temperature in this city stood at 39° below zero; and at Kokomo, eighteen miles north, it was 43° below zero.

Illinois.—Lincoln, 9th: at 7 a. m. of this date, the mercury stood at 14° below zero, and remained several degrees below all day. On the morning of the 22d, the temperature fell to -18°, being the coldest weather experienced here for years. Peoria, 22d: the temperature fell to -22° on this date. No lower temperature has been recorded at this place since the winter of 1855-6. In January, 1864, and 1873, and December, 1872, the temperature also fell to -22°. Quincy, 22d: early this morning the temperature was from 21° to 28° below zero in different exposed localities. At 8 a. m. the temperature was -8°; at noon, zero, and at 4 p. m., 10°. Shelbyville, 9th: the temperature ranged from 10° to 12° below zero during the morning. Ice men anticipate a good harvest. Warsaw, 22d: the weather of the last few days has been the coldest experienced here during the last forty years.

Iowa.—Cresco: the temperature remained below zero from the morning of the 19th to that of the 25th. On the morning of the 22d, the minimum temperature was -34°, which is the lowest that has been recorded here for many years. Dubuque, 9th: temperature from 20° to 22° below zero; coldest day with but one exception, known for many years. On the 22d, owing to the extremely low temperature, trains from the north were delayed five hours, it being impossible to keep up steam. Stock has suffered severely in this county; many cases of freezing have been reported. Nearly all out-door work has been suspended. Trains were also delayed by the extreme cold on 23d. Logan: extremely cold from the 19th to the 23d, the temperature ranging from 4° to -26°.

Kansas.—Leavenworth, 20th: temperature, -20°, lowest of season; all out-door work suspended. Topeka: from the 18th to the 24th, the temperature fell below zero on each day. Independence: the mean temperature of the 19th and 20th is the lowest ever recorded here. Wichita, 22d: the late weather has been the coldest known in this section for years. Stock men from the Cherokee lands and southern Kansas report the losses as comparatively small. While the weather was intensely cold, there was no sleet, otherwise the loss of stock would have been very great.

Louisiana.—Point Pleasant, 21st: the mean temperature of this date nearly corresponds to the mean of January 20, 1838, which is said to have been the coldest day of this century at this place.

Maine.—Bangor, 6th: the thermometer registered 36° below zero in the northern part of Penobscot county during the morning. Calais, 26th: temperature, -26° at 7 a. m.

Michigan.—Coldwater: at 5 p. m. of the 20th, the thermometer recorded 30°; at 10 p. m., 2°; at 1 a. m. of the 21st, -14°; at 6 a. m., -22°; at 10 a. m., -18°, and did not rise above -5° during the day. On the 22d, at 6 a. m., the temperature was -24°, and did not rise above -12° during the day. On the 23d, the lowest observed was -20°, and at 2 p. m. rose to zero. This is considered the coldest weather experienced here for more than twenty years.

Nebraska.—Omaha, 19th: minimum temperature -22°. The suffering from cold was intense; many persons had their ears, hands, and feet frozen.

New Mexico.—Regina, 20th: the worst storm ever experienced in this part of the country now prevails throughout the territory. The temperature stands at 58° below zero.

Texas.—Buffalo, 19th: temperature 16° and the ground covered with two inches of sleet. Corsicana, 19th: the weather is bitterly cold and snow fell throughout the day. This is the first snow that has fallen here for more than two years. Dallas, 22d: the cold weather continues, though it has moderated somewhat; all streams are frozen. The cold weather has been very disastrous to cattle and sheep and especially to lambs and calves, in the northwestern part of the state, where they are reported to be dying in large numbers. Fort Worth, 19th: a norther struck this city during the night and the temperature

fell to 12°. Giddings, 19th: the thermometer, at 4 a. m., stood at 15°. The heaviest freeze for many years is expected. Hillsboro, 19th: the weather is intensely cold and a fine mist of snow has been falling all day. Marshall 20th: last night and to-day were the coldest of the season, the temperature being 18° at sunrise. McKinney, 19th: extremely cold weather; mercury 10° above zero. San Saba, 19th: the thermometer recorded 12°, on this date, being the lowest for the winter. The weather is very severe on cattle and sheep.

Utah.—Salt Lake City, 20th: the temperature in this city reached 20° below zero this morning. Temperatures as low as 40° below zero are reported from neighboring places in Utah.

Washington Territory.—Bainbridge Island, 19th: coldest day of the past five years; minimum temperature 12°.

Wisconsin.—Embarrass: at 5 a. m. of the 21st, the mercury froze at -40° and remained frozen until 8.30 a. m.

FROSTS.

In the various districts they were reported on the following dates:—

New England.—1st to 31st.

Middle Atlantic states.—1st to 5th, 8th to 13th, 15th to 20th, 22d to 27th, 29th, 30th, 31st.

South Atlantic states.—1st, 2d, 3d, 5th, 9th to 17th, 22d to 25th, 27th, 28th, 30th.

Eastern Gulf.—1st, 2d, 9th to 12th, 14th, 15th, 21st to 34th, 29th, 30th.

Western Gulf.—1st, 2d, 4th, 6th to 12th, 14th, 18th to 25th, 28th to 31st.

Rio Grande valley.—7th to 11th, 14th, 20th to 23d, 29th, 30th, 31st.

Ohio valley and Tennessee.—1st to 16th, 18th to 31st.

Lower lakes.—1st to 31st.

Upper lakes.—1st to 31st.

Extreme northwest.—1st to 31st.

Upper Mississippi valley.—1st to 31st.

Missouri valley.—1st to 31st.

Northern slope.—1st to 10th, 12th to 31st.

Middle slope.—1st to 5th, 7th 8th, 10th, 11th, 14th, 15th, 17th, 18th, 21st, 24th, 25th, 26th, 28th, 29th, 31st.

Southern slope.—1st to 4th, 6th to 11th, 13th, 14th, 18th to 25th, 28th, 29th.

Southern plateau.—1st to 31st.

Middle plateau.—1st, 2d, 3d, 5th, 6th, 8th to 13th, 15th, 16th, 18th, 19th, 20th, 22d, 23d, 27th.

California.—2d to 24th, 26th, 27th, 28th.

The occurrence of frosts has also been reported by the following stations, not included in the districts named above: Cedar Keys, Florida, 12th, 24th; Umatilla, Oregon, 10th, 11th, 12th; Roseburg, Oregon, 1st, 2d, 4th, 7th to 11th, 18th to 23d; Olympia, Washington Territory, 1st, 2d, 12th, 13th, 17th; San Diego, California, 7th, 20th.

ICE.

The subject of the formation of ice in the northern sections, is considered elsewhere in the REVIEW under the heading "ice in rivers and harbors." The following are exceptional cases of ice formation in the southern sections of the country:—

Alabama.—Auburn, 11th.

Arizona.—Tucson, 9th; Yuma, 20th, 21st.

California.—Los Angeles, 20th; Visalia, 12th.

Florida.—Jacksonville, 10th, 12th, 13th, 14th; Pensacola, 10th, 23d; Saint Augustine, 10th, 12th.

Georgia.—Augusta, 12th; Quitman, 10th, 12th, 24th.

Louisiana.—New Orleans, 9th.

Mississippi.—Fayette, 22d, 23d.

North Carolina.—Fort Macon, 10th, 12th.

South Carolina.—Stateburg, 11th, 13th.

Texas.—Brownsville, first ice, 9th; Eagle Pass, 1st, 9th, 14th, 19th, 20th to 23d; Fort Concho, 1st, 8th, 13th; Fredericksburg, 20th; Galveston, 9th, 20th, 21st; Indianola, 2d, 9th, 20th; Palestine, 20th.

PRECIPITATION.

[Expressed in inches.]

The distribution of rainfall over the United States and Canada, as determined from observations taken at more than five hundred stations, is exhibited on chart iv. Owing to lack of reports from certain sections, the lines upon the chart indicating the amount of precipitation have not been completed; viz.: from northeastern New York eastward over northern Maine; in northern Wisconsin and northwestern Michigan; from southern Idaho and northern Nevada to central Oregon.

There has been an excess over the average January rainfall in all the districts bordering on the Atlantic and Gulf coasts, except in southern Texas. The excesses are very large in the south Atlantic and east Gulf states, being 4.00 and 5.31 respectively. In the other districts named, the departures vary from 0.29 in New England, to 0.73 in the west Gulf states. In Tennessee, the upper lake region, the extreme northwest, Missouri valley and northern plateau, the rainfall is also above the January average. In those districts the excesses are small, varying from 0.03 to 0.31, except in the northern plateau where the departure is 1.07. An area of deficiency embraces the lower lakes, the upper Mississippi and Ohio valleys, and the whole of the country lying west of the one-hundredth meridian, except in the extreme northwest and northern plateau. A marked deficiency occurs on the Pacific coast, especially in the middle Pacific, where it amounts to 4.14. In the other districts embraced in the area of deficiency, the departures vary from 0.03 in the northern slope, to 1.11 in the Rio Grande valley.

In the first column of the following table is given the average January precipitation in the various districts for several years; in the second column is given the average for January, 1883; and the third column shows the excess or deficiency of January, 1883, as compared with the average of previous years.

Average precipitation for January, 1883.

Districts.	Average for January. Signal Service observations.		Comparison of Jan., 1883, with the average for several years.
	For several years.	For 1883.	
	Inches.	Inches.	Inches.
New England.....	3.68	3.97	0.29 excess.
Middle Atlantic states.....	3.73	4.22	0.49 excess.
South Atlantic states.....	4.19	8.19	4.00 excess.
Florida peninsula.....	3.00	3.63	0.63 excess.
Eastern Gulf.....	4.98	10.29	5.31 excess.
Western Gulf.....	2.82	3.55	0.73 excess.
Rio Grande valley.....	1.52	0.41	1.11 deficiency.
Tennessee.....	6.32	6.45	0.13 excess.
Ohio valley.....	3.59	3.17	0.42 deficiency.
Lower lakes.....	2.52	1.84	0.68 deficiency.
Upper lakes.....	1.69	1.72	0.03 excess.
Extreme northwest.....	0.57	0.88	0.31 excess.
Upper Mississippi valley.....	1.59	1.31	0.28 deficiency.
Missouri valley.....	0.74	0.80	0.06 excess.
Northern slope.....	0.66	0.63	0.03 deficiency.
Southern slope.....	0.80	0.08	0.72 deficiency.
Northern plateau.....	1.25	2.32	1.07 excess.
Middle plateau.....	0.94	0.83	0.11 deficiency.
Southern plateau.....	0.81	0.76	0.05 deficiency.
North Pacific.....	8.19	7.46	0.73 deficiency.
Middle Pacific.....	5.81	1.67	4.14 deficiency.
South Pacific.....	2.31	0.93	1.38 deficiency.
Mt. Washington, N. H.....	4.29	4.10	0.19 deficiency.
Pike's Peak, Colo.....	1.89	0.54	1.35 deficiency.
Fort Elliott, Tex.....	0.27	trace.	0.27 deficiency.

DEVIATIONS FROM AVERAGE PRECIPITATION.

The departures exhibited by the reports from the regular Signal Service stations are shown in the above table of average precipitation. The Chief Signal Officer is indebted to voluntary observers for the following interesting items bearing upon this subject. These comparisons are of special importance, as many of the records from which they are made cover long periods, some extending back many years before the establishment of the Signal Service.

Illinois.—Anna: monthly precipitation, 2.25, or 1.73 below the January average of the last eight years. The largest monthly precipitation for January during that period, 13.25, was that of 1876; the smallest, 0.91, was that of 1875. Riley: monthly precipitation, 2.18, is 0.35 above the January average

Table of Excessive, Greatest and Least Monthly Rainfalls.

STATION.	SPECIALLY HEAVY.			Largest Monthly.	SMALLEST MONTHLY.	
	Date.	Amt.	Duration	Amount.	STATION.	Amt.
Alabama.					Arizona.	
Green Springs.....				10.47	Texas Hill.....	0.19
Mount Vernon Barracks.....	17, 18, 19	5.30		10.30	Fort Verde.....	0.31
Mobile.....	17, 18	2.65		8.80	Prescott.....	0.44
Auburn.....				8.79	San Simon.....	0.50
Montgomery.....	18, 19	1.93		7.20	California.	
Arkansas.					Delano.....	0.00
Little Rock.....	3, 4	2.08			Fresno.....	0.00
California.					Goshen.....	0.00
Fort Bidwell.....	31	2.04			Kingsburg.....	0.00
Red Bluff.....	1	1.90			Mammoth Tank.....	0.00
Florida.					Mojave.....	0.00
Pensacola.....	16, 17, 18	5.46		9.97	Summer.....	0.00
Fort Barrancas.....	17	2.50		7.45	Calliente.....	0.04
Cedar Keys.....	9	2.10			Visalia.....	0.06
Georgia.					Tehachapi.....	0.15
Atlanta.....	19, 20, 21	6.53		15.82	White Water.....	0.15
Do.....	4, 5, 6	6.18			Keene.....	0.17
Quitman.....	8, 9	3.30		11.50	Ravenna.....	0.30
Do.....	18, 19	2.10			Colton.....	0.32
Do.....	26, 27	2.10			Spadra.....	0.40
Forsyth.....				10.08	Willow.....	0.43
Savannah.....	18	3.48		7.34	Colorado.	
Augusta.....	19, 20	2.04		7.00	West Las Animas.....	0.14
Louisiana.					Colorado Springs.....	0.35
Point Plaisant.....	19, 20	4.17		13.17	Dakota.	
Do.....	5, 6	3.25			Fort Meade.....	0.01
Do.....	15, 16	3.11			Fort Sisseton.....	0.13
New Orleans.....	28	3.71		10.63	Fort Sully.....	0.17
Do.....	28	2.16			Rapid City.....	0.18
Port Eads.....	18, 19	2.96		8.83	Pembina.....	0.20
Do.....	16, 17	2.48			Smithville.....	0.23
Mississippi.					Bismarck.....	0.28
Fayette.....	5, 6	7.20		12.40	Fort Yates.....	0.28
Do.....	13	2.20			Alexandria.....	0.35
Starkville.....	4	2.06		9.85	Fort Bennett.....	0.37
New Jersey.					Fort Stevenson.....	0.41
Vineyard.....				6.13	Indiana Territory.	
North Carolina.					Fort Supply.....	0.11
Sloop Point.....	15, 16, 17	4.25		14.18	Fort Sill.....	0.20
Hatteras.....	19, 20	3.68		13.90	Kansas.	
Do.....	8, 9	2.62			Salina.....	0.03
Do.....	28, 29	2.60			Creswell.....	0.13
Portsmouth.....	8, 9	3.10		11.43	South Haven.....	0.20
Do.....	18, 19	2.88			Manhattan.....	0.25
Murphy.....				10.60	Pretty Prairie.....	0.25
Highlands.....	19, 20	2.50		9.90	Levy.....	0.20
Charlotte.....	19, 20	2.95		8.87	Oxford.....	0.30
Fort Macon.....	9, 10	2.45		8.85	Belle Plain.....	0.35
Do.....	18, 19	2.11			Wellington.....	0.37
Wilmington.....	8, 9	2.51		6.33	Argyle.....	0.38
Kittyhawk.....	9, 10	2.20			Clay Centre.....	0.40
Smithville.....	8, 9	1.99			Milan.....	0.40
Oregon.					Fort Leavenworth.....	0.48
Portland.....	5, 6	7.23		13.71	Rolling Green.....	0.48
Do.....	28, 29	2.18			Topeka.....	0.50
Eola.....				7.37	Minnesota.	
Fort Stevens.....	5, 6	2.40			Saint Vincent.....	0.33
Pennsylvania.					Missouri.	
Wellsborough.....				7.12	Greenfield.....	0.30
South Carolina.					Phelps City.....	0.30
Aiken.....				6.96	Montana.	
Tennessee.					Glendive.....	0.08
Chattanooga.....				9.31	Fort Keogh.....	0.18
Knoxville.....	20	2.54		7.94	Fort Ouster.....	0.22
Texas.					Terry's Landing.....	0.38
New Ulm.....				7.72	Nebraska.	
Galveston.....	5, 6	3.61		6.46	Nebraska City.....	0.50
Virginia.					Nevada.	
Norfolk.....				6.91	Humboldt.....	0.00
Washington Territory.					Elko.....	0.02
Fort Canby.....	5, 6	2.42		9.38	Brown's.....	0.05
					Golconda.....	0.11
					Hot Springs.....	0.20
					Pioche.....	0.20
					Tecoma.....	0.20
					Wadsworth.....	0.20
					Toano.....	0.50
					New Mexico.	
					Deming.....	0.10
					Lordsburg.....	0.33
					Santa Fe.....	0.42
					New York.	
					Hector.....	0.50
					Rhode Island.	
					Fort Adams.....	0.40
					Texas.	
					Fort Stockton.....	0.00
					Fort Elliott.....	0.01
					Eagle Pass.....	0.01
					Fort Davis.....	0.02
					Fort McKavett.....	0.02
					Coleman City.....	0.09
					El Paso.....	0.10
					Brackettville.....	0.13
					Concho.....	0.18
					Uvalde.....	0.28
					San Antonio.....	0.37
					Utah.	
					Kelton.....	0.45
					Promontory.....	0.50
					Wyoming.	
					Fort Bridger.....	0.41

of the last twenty-two years. Swanwick: monthly precipitation, 1.41, is about 2.40 below the January average.

Indiana.—Logansport: monthly precipitation, 1.75, is 0.34 below the January average of the last twenty-four years. The monthly snowfall, 15.35 inches is 5.03 above the January average. The only years in which a greater depth of snow fell during January are: 1862, 24.00 inches; 1867, 23.00; 1873, 35.36. Vevay: monthly precipitation, 3.31, is 0.76 below the January average of the last eight years. The depth of snowfall during the month, 2.95 inches, or 6.39 below the January average.

Iowa.—Clinton, monthly precipitation, 1.25 or 0.28 the January average.

Kansas.—Lawrence, monthly precipitation, 0.73, or 0.49 below the January average of the last sixteen years. The smallest January precipitations of that period were 0.17 and 0.12, which fell in 1872 and 1875 respectively; the largest, 3.05, fell in 1878. The depth of snowfall for the month was 5.50 inches or 1.58 below the January average. Yates Centre, monthly precipitation 0.55, or 0.49 below the January average of the last three years. Wellington, monthly precipitation, 0.37, or 0.34 below the January average of the last four years.

Maine.—Gardiner, monthly precipitation, 2.50, or 0.74 below the January average of the last forty-seven years.

Maryland.—Fallston, monthly precipitation, 4.27, or 0.70 above the January average of the last thirteen years. The greatest January precipitation of that period, 6.63, was that of 1882; the least, 1.20, was that of 1872.

New Hampshire.—Antrim, monthly precipitation, 2.85, or 0.83 below the January average of the last ten years. Snow fell to a depth of 13.50 inches, which is 6.88 less than the average for January. Grafton, monthly precipitation, 2.14, or 1.13 below the average of the last fourteen years. Contoocookville, monthly precipitation, 2.12, is slightly below the January average of the last twelve years. Snow fell to a depth of 17.00 inches, which is slightly above the January average.

New York.—Palermo: Monthly precipitation, 2.95, or 0.15 below the January average of the last thirty years. The largest January precipitation of that period was 4.70, in 1867; the smallest was 1.50, in 1866 and 1869. Snow fell to a depth of 33.00 inches which is 11.00 more than the January average. The largest January snowfall, 47.00 inches, fell in 1867; the smallest, 2.00 inches, fell in 1882. North Volney: Monthly precipitation, 2.35, or 0.77 below the January average of the last eleven years. During that period the largest January precipitation, 5.95, was that of 1874; the smallest, 2.30, was that of 1880.

Vermont.—Woodstock: Monthly precipitation, 2.41, or 0.61 below the January average of the last fourteen years. During that period the largest January precipitation, 6.21, was that of 1870; the smallest, 1.55, was that of 1872. During the last twenty-two years, the largest monthly snowfall was 37.7 inches, which fell in 1875; the smallest, 14.0 inches, fell in 1866; monthly snowfall for January 1883 is 22.4 inches.

Virginia.—Wytheville: Monthly precipitation, 4.04, or 0.51 above the January average. Variety Mills: Monthly precipitation, 3.97, or 0.12 below the January average of the last four years.

The following table showing the monthly and annual rainfalls with the monthly and annual averages, and the rainfall by seasons with the numbers of rainy days at Sacramento, California, from January, 1853 to December, 1882, have been compiled by Sergeant James A. Barwick, Signal Corps, U. S. A. The data used in their preparation from January, 1853, to December, 1874, are from a record kept by Dr. F. M. Logan, and were furnished by Mr. E. P. Smith, Secretary of the State Agricultural Society. The data used from January, 1875, to July, 1877, were obtained from Dr. F. W. Hatch, Secretary of the State Board of Health, and from Mr. S. H. Gerrish, a local observer of Sacramento; and from July, 1877, to December, 1882, the records of the Signal Service have been used.

The precipitation for January, 1883, (Signal Service) is 2.23, or 1.79 below the average of January, for the twenty-nine preceding years.

Monthly and annual rainfalls with monthly and annual averages at Sacramento, California.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual sums.	Monthly average.
1853	3.00	2.00	7.00	3.50	1.45	—	—	0.00	—	—	1.50	13.47	31.86	2.66
1854	3.25	8.50	3.25	1.50	0.21	0.31	0.00	—	—	1.01	0.65	1.54	20.22	1.68
1855	2.67	3.45	4.20	4.32	1.15	0.01	0.00	0.00	—	0.00	0.70	1.15	17.72	1.48
1856	4.92	0.69	1.41	2.13	1.84	0.05	0.00	0.00	—	0.30	0.65	2.60	13.87	1.16
1857	1.38	4.80	0.68	—	—	0.35	0.00	—	0.00	0.66	2.41	2.40	12.68	1.06
1858	2.45	2.45	2.88	1.31	0.20	0.10	0.01	—	—	3.01	0.15	2.63	15.10	1.26
1859	0.96	3.91	1.64	0.08	1.04	0.00	0.03	0.00	0.02	0.00	6.40	4.34	10.41	1.62
1860	2.31	0.93	5.11	2.88	2.49	0.02	0.00	0.00	0.06	0.92	0.18	1.84	16.74	1.39
1861	2.67	2.92	3.32	0.48	0.80	0.13	0.55	0.00	0.00	—	2.17	4.26	17.11	1.43
1862	15.04	4.26	2.80	0.82	1.81	0.01	0.01	0.00	0.00	0.36	—	8.64	33.75	2.81
1863	1.73	2.75	2.36	1.60	0.36	0.00	—	—	—	0.00	1.49	2.33	12.71	1.06
1864	1.08	0.19	1.30	1.08	0.74	0.09	0.00	0.08	—	0.12	6.72	1.81	13.21	1.10
1865	4.78	0.71	0.48	1.37	0.46	0.00	0.01	0.00	0.08	0.48	2.43	7.87	18.67	1.56
1866	7.70	2.01	2.08	0.48	2.25	0.10	0.02	0.00	—	—	2.43	0.36	17.37	1.45
1867	3.44	7.10	1.01	1.80	0.01	—	—	—	0.01	—	3.81	9.51	20.60	2.32
1868	6.04	3.15	4.35	2.31	0.27	—	0.00	0.00	0.00	—	0.77	12.85	30.74	2.48
1869	4.79	3.63	2.94	1.24	0.65	0.01	0.00	0.00	—	2.12	0.85	2.61	18.84	1.57
1870	1.37	3.34	1.64	3.12	0.27	—	—	—	0.00	0.09	0.58	1.96	11.20	0.93
1871	2.08	1.92	0.60	1.45	0.75	—	0.00	0.00	—	0.21	1.22	0.97	9.30	0.78
1872	4.04	4.74	1.94	0.61	0.28	0.02	0.00	—	—	0.22	1.93	10.59	24.37	2.03
1873	1.23	4.36	0.55	0.51	0.00	—	0.02	—	0.00	0.31	1.21	5.39	13.58	1.13
1874	5.20	1.86	3.05	0.89	0.37	—	—	0.00	0.05	2.25	3.80	70.01	27.49	2.29
1875	8.71	6.55	0.80	—	—	1.10	0.00	0.00	0.00	0.44	6.20	0.44	24.24	2.02
1876	4.99	3.75	4.15	1.10	0.15	0.00	0.21	0.02	0.00	3.45	0.30	5.52	23.64	1.97
1877	2.77	1.04	0.50	0.19	0.64	0.01	—	—	0.00	0.73	1.07	0.00	7.01	0.58
1878	9.26	8.04	3.09	1.07	0.17	0.00	0.00	0.00	0.29	0.55	0.51	1.43	24.41	2.03
1879	3.18	3.88	4.88	2.60	1.30	0.13	—	—	0.00	0.88	2.05	0.47	19.43	1.62
1880	1.64	1.83	1.70	14.20	0.76	0.00	—	0.00	0.00	0.00	0.05	3.41	23.59	1.97
1881	6.14	5.06	1.37	1.64	—	0.50	—	0.00	0.30	0.55	1.88	11.81	29.25	2.44
1882	1.80	2.40	3.78	1.99	0.35	0.10	—	0.00	0.57	2.63	3.22	3.37	30.30	1.68
Sums	120.71	102.15	74.94	56.24	20.58	3.03	0.87	0.10	1.38	21.12	57.48	134.85	593.40	49.46
Means	4.024	3.405	2.498	1.874	0.686	0.101	0.029	0.003	0.046	0.704	1.916	4.495	19.780	1.649

— Inappreciable.

Rainfall by seasons, with number of rainy days, at Sacramento, California.

Year.	Winter.		Spring.		Summer.		Autumn.		Annual sums.	Total No. of days.
	Dec., Jan. & Feb.		Mar., Apr., May.		June, July, Aug.		Sept., Oct., Nov.			
	Amount.	No. of days.	Amount.	No. of days.	Amount.	No. of days.	Amount.	No. of days.		
1853.....	18.41*	38	11.95	19	—†	3	1.50	7	31.86	67
1854.....	13.20	24	4.96	17	0.31	3	1.66	14	20.22	58
1855.....	7.28	30	9.67	24	0.01	1	0.76	10	17.72	65
1856.....	7.61	35	5.38	17	0.03	1	0.85	17	13.87	70
1857.....	8.58	44	0.68	14	0.35	3	3.07	13	12.68	74
1858.....	7.54	47	4.39	20	0.11	2	3.16	21	15.10	95
1859.....	9.21	54	3.66	24	0.03	1	6.51	18	19.41	97
1860.....	5.05	46	10.48	35	0.02	2	1.16	16	16.74	99
1861.....	9.87	39	4.39	14	0.68	7	2.17	13	17.11	73
1862.....	27.94	53	5.43	33	0.02	2	0.30	25	33.75	96
1863.....	6.81	32	4.41	21	—†	3	1.49	8	12.71	61
1864.....	3.08	19	3.12	24	0.17	6	6.84	12	13.21	68
1865.....	13.30	35	9.31	12	0.01	3	2.99	16	18.67	75
1866.....	10.67	38	4.75	22	0.12	5	2.43	10	17.37	75
1867.....	20.05	45	2.82	14	—†	3	3.82	8	26.69	78
1868.....	22.04	44	6.93	23	—†	3	0.77	8	29.74	76
1869.....	11.03	30	4.83	19	0.01	1	2.97	6	18.84	56
1870.....	6.57	27	4.03	14	—†	3	0.60	8	11.20	52
1871.....	4.97	25	2.90	19	—†	1	1.43	10	9.30	55
1872.....	19.37	51	2.83	19	0.02	3	2.15	8	24.37	81
1873.....	10.96	40	1.66	8	0.02	4	1.52	9	13.59	61
1874.....	17.07	44	4.31	26	—†	3	6.11	18	27.49	91
1875.....	15.70	42	0.80	13	1.10	2	6.64	14	24.24	71
1876.....	14.26	37	5.40	27	0.23	3	3.75	8	23.64	75
1877.....	3.81	20	1.39	20	0.01	3	1.80	12	7.01	55
1878.....	18.73	39	4.33	21	0.00	0	1.35	7	24.41	67
1879.....	7.53	23	8.84	31	0.13	3	2.93	12	19.43	69
1880.....	6.88	29	16.66	25	—†	1	0.05	2	23.59	57
1881.....	23.01	43	3.01	13	0.50	3	2.73	11	29.25	70
1882.....	7.56	25	6.12	19	0.10	2	6.42	15	20.20	61
Sums.....	357.69	1,098	151.74	577	3.99	85	79.98	341	593.40	2,131
Means.....	11.92	36.6	5.06	20.2	0.13	2.8	2.67	11.4	19.78	71

* The rainfall of December, 1852, has been used in completing the winter's rainfall opposite 1853; the rainfall of December, 1853, for that opposite 1854, etc. —† Inappreciable.

The following table shows the greatest and least number of rainy (upon which rain fell) and cloudy days, and the percentages of mean relative humidity, as reported from the various districts:

Table of rainy and cloudy days and relative humidity for January, 1883.

Districts.	Rainy days	Cloudy days.	Relative humidity.*
	From 15 to 21	From 3 to 16	Percentages.
New England	" 13 24	" 10 18	From 66.0 to 82.8
Middle Atlantic states	" 13 24	" 10 18	" 64.9 " 85.8
South Atlantic states	" 11 22	" 6 15	" 71.3 " 91.3
Florida peninsula	" 10 11	" 5 10	" 81.3 " 83.8
Eastern Gulf	" 15 19	" 5 13	" 71.1 " 78.9
Western Gulf	" 8 16	" 5 13	" 68.0 " 84.3
Rio Grande valley	" 3 14	" 2 10	" 56.2 " 78.2
Ohio valley and Tennessee	" 11 25	" 13 21	" 60.1 " 81.7
Lower lakes	" 19 26	" 12 22	" 67.0 " 86.4
Upper lakes	" 16 27	" 9 26	" 71.0 " 84.0
Extreme northwest	" 10 14	" 4 11	" 79.6 " 94.3
Upper Mississippi valley	" 14 20	" 3 11	" 56.4 " 77.5
Missouri valley	" 8 18	" 3 9	" 53.2 " 76.5
Northern slope	" 4 15	" 4 14	" 42.5 " 86.7
Middle slope	" 4 9	" 2 8	" 50.7 " 83.3
Southern slope	" 0 9	" 0 6	" 28.6 " 67.0
Southern plateau	" 0 9	" 1 7	" 47.4 " 70.6
Middle plateau	" 6 12	" 3 10	" 59.9 " 82.2
Northern plateau	" 7 22	" 3 19	" 75.0 " 83.0
North Pacific	" 19 21	" 10 20	" 79.1 " 84.4
Middle Pacific	" 4 12	" 3 5	" 74.3 " 82.7
South Pacific	" 2 5	" 3 6	" 50.4 " 75.3

* Relative humidity corrected for altitude.

HAIL.

The dates on which hail has been reported are as follows:—
Arizona.—Fort Verde, 19th; Fort Bowie, 14th, 16th, 19th.
Arkansas.—Mount Ida, 20th, 21st.
California.—Cape Mendocino, 28th.
Connecticut.—Bethel, 20th.
Dakota.—Fort Randall, 26th, 28th.
Indiana.—Vevay, 4th, 13th, 29th.
Iowa.—Monticello, 10th; Clinton, 3d, 4th, 16th.
Kansas.—Yates Centre, 3d, 19th; Fort Scott, 12th.
Massachusetts.—Williamstown, 27th.
Missouri.—Protem, 20th.
New Jersey.—Moorestown, 6th, 19th; Bordentown, 13th; Manasquan, 19th.
New Mexico.—Fort Cummings, 19th.
New York.—New York City, 31st.
North Carolina.—Life-saving Station No. 6, 16th; Weldon, 16th; Chapel Hill, 21st.
Ohio.—College Hill, 20th.
Oregon.—Fort Stevens, 11th.
Pennsylvania.—Catawissa, 6th, 7th; Wellsboro, 27th, 28th; West Chester, 13th; Grampian Hills, 17th, 19th.

Texas.—Palestine, 19th; Galveston, 21st; Fort Concho, 2d.
Wisconsin.—Manitowoc, 12th.

It is probable that some of the above reports are incorrect, and should have been recorded as sleet instead of hail.

SNOW.

The dates on which snow is reported to have fallen in the various districts are as follows:—

New England states.—1st to 11th, 13th to 22d, 24th to 31st.

Middle Atlantic states.—1st, 2d, 4th to 14th, 16th, 17th, 19th, 20th, 21st, 23d, 25th to 30th.

South Atlantic states.—9th, 10th, 11th, 14th.

Eastern Gulf.—8th, 9th, 11th.

Western Gulf.—1st, 8th, 12th, 19th, 20th.

Ohio valley.—1st, 2d, 4th, 5th, 6th, 8th to 17th, 20th to 25th, 29th, 30th, 31st.

Tennessee.—1st, 2d, 8th to 11th, 14th, 20th, 21st.

Lower lakes.—1st to 26th, 28th to 31st.

Upper lakes.—1st to 31st.

Extreme northwest.—2d, 4th to 7th, 9th to 13th, 17th, 18th, 19th, 21st to 27th, 29th, 30th, 31st.

Upper Mississippi valley.—1st, 2d, 4th to 13th, 15th to 27th, 29th, 30th, 31st.

Missouri valley.—3d to 10th, 12th to 26th, 28th to 31st.

Northern slope.—1st to 7th, 10th, 12th, 14th to 22d, 24th, 25th, 27th to 31st.

Middle slope.—3d, 4th, 5th, 7th, 14th, 15th, 16th, 18th, 19th, 20th, 26th, 30th, 31st.

Southern slope.—8th, 9th, 19th, 20th.

Southern plateau.—3d, 4th, 5th, 8th, 14th, 15th, 16th, 19th, 20th.

Middle plateau.—1st, 3d, 4th, 14th to 18th, 21st, 24th, 25th, 26th, 29th, 30th.

Northern plateau.—2d, 3d, 4th, 6th, 7th, 12th to 17th, 20th, 21st, 24th, 25th, 27th, 29th, 30th, 31st.

Snow also fell in the following states and territories, not included in the districts named above:—

California.—Fort Bidwell, 3d to 6th, 24th to 27th. San Francisco, 1st, Los Angeles, 2d; snow in mountains during the morning.

Oregon.—Fort Klamath, 3d, 4th, 14th, 15th, 16th, 23d to 26th.

Washington Territory.—Fort Townsend, 4th, 14th, 15th, 19th, 22d.

The following are reports of unusually severe snow-storms, which have occurred during the month:—

Newport, Rhode Island, 10th.—Snow-drifts are from two to ten feet deep; estimated to be about one foot deep on the level; trains on the Old Colony railroad were delayed on account of snow-drifts.

Dubuque, Iowa, 9th.—Very heavy snow-storms; all incoming trains delayed from one to three hours by snow-drifts. 16th, railroad travel still impeded by snow-drifts; also on the 19th, and 20th. On the 30th, no trains arrived from the west; snow blockade on the western division of the Illinois Central railway.

Saint Paul, Minnesota, 10th.—Snow badly drifted, causing delay of trains on all the railroads centring here. 13th and 14th, trains again delayed on account of snow blockades. 19th, railroads obstructed by snow blockades and trains abandoned on the Northern Pacific, the Saint Paul, Minneapolis and Manitoba, and the Sioux City and Saint Paul railroads; all other trains arrive from two to six hours late. 20th, the snow blockades continue on all roads running northwest and south, but trains arrive on time from eastern points. 21st, trains on time from eastern points; trains on the roads running north and south are from two to four hours late. Snow blockades continued on the 22d, 23d, and 24th. 25th, road snow unobstructed; trains arrive and depart on time. 31st, railroads again blockaded by snow-storm of the 30th.

Huron, Dakota, 12th.—Trains are blockaded east of this place by snow-drifts. 13th, very heavy snow-storm in Minnesota, blockading trains. Snow blockades interrupted railroad travel from the 19th to the close of the month.

Billings, Montana, 22d.—Snow is from one to one and a half feet deep on the level, and from ten to thirty feet deep in ravines. Cresco, Iowa, 13th.—Snow badly drifted; railroad travel suspended. The railroads were also obstructed by snow-drifts on the 20th and 31st.

LARGEST MONTHLY SNOWFALLS.

[Expressed in inches.]

The following are the largest monthly snowfalls reported from the various states and territories during the month:—

Arizona.—Fort Apache, 5.25.

California.—Alta, 11; Brentwood, 10; Summit, 10; Cisco, 9; Byron, 8; Lathrop, 8; Antioch, 7; Martinez, 6; Modesto, 6; Tracy, 5; Fort Bidwell, 4.75.

Colorado.—Fort Lyon, 11; Fort Collins, 10; Fort Garland, 9.

Connecticut.—New Haven, 11; Southington, 8.25; New London, about 6.

Dakota.—Fort Lincoln, 11; Yankton, 10.50; Fort Totten, 9.25; Fort Hall, 7; Morrilton, 6; Wicklow, 5.50; Fort Ellis, 3.

District of Columbia.—West Washington, 11.50.

Idaho.—Eagle Rock, 20.75.

Illinois.—Rockford, 19.50; Riley, 18.75; Elmira, 18; Chicago, 16; Springfield, 11; Champaign, 10.75; Charleston, 9.75; Bunker Hill, 6; Mattoon, 6.

Indiana.—Logansport, 16.25; Wabash, 11.50; Lafayette, 10; Greensburg, 9; Monticello, 8.75; Indianapolis, about 8; Fort Wayne, 5.75; Rising Sun, 5.

Iowa.—Des Moines, 23; Logan, 23; Ames, 21; Humboldt, 16.50; Keokuk, 16.50; Dubuque, 16; Muscatine, 16; Indianola, 15.75; Clinton, 14; Independence, 14; Cresco, 13; Cedar Rapids, 10.75; Monticello, 10.75; Davenport, 10.50; Guttenburg, 10.25.

Kansas.—Leavenworth, 7.50; Salina, 7; Lawrence, 5.50; Manhattan, 4.50; Fort Scott, 4.25.

Maine.—Dexter, 21.50; Eastport, 19.50; Cornish, 18; Orono, 15; Gardiner, 14.

Maryland.—Cumberland, 15; Fallston, 15; Sandy Springs, 11.75; Emmittsburg, 11.25; Baltimore, 5.50.

Massachusetts.—Somerset, 19.25; Fort Warren, 19; Provincetown, 17.50; Fall River, 16; Worcester, 14.25; Princeton, 11.25; Charlestown, 9.75; Boston, 9.50; Westborough, 9.50; Milton, 9; Mendon, 7.

Michigan.—Mackinac City, 50; East Tawas, 47; Northport, 40.50; Traverse City, 39; Hastings, 33; Harrisonville, 28; Marquette, 23.50; Alpena, 22; Ionia, 20.50; Grand Haven, about 20; Reed City, 16.75; Kalamazoo, 16; Escanaba, 13; Litchfield, 13; Port Huron, 13; Detroit, 12; Hillsdale, 11.50; Lansing, 11.50; Marshall, 11; Thornville, 9; Cold Water, 5.50.

Minnesota.—Minneapolis, 22.25; Moorhead, 12; Northfield, 10.75; Saint Paul, 6.50.

Missouri.—Bedford, 11.25; Curryville, 8.25; Corning, 7.25; Pierce City, 7; Springfield, 5.25.

Montana.—Fort Assiniboine, 26.75; Fort Missoula, 13.50; Cartersville, 11.25; Fort Shaw, 9; Fort Benton, 7.50; Billings, 6.25; Helena, 5.75; Fort Shaw, 5.

Nebraska.—Nebraska City, 18.25; De Soto, 14.50; Genoa, 13; North Platte, 12; Utica, 11.25; Omaha, 10; Lincoln, 9; Fort Niobrara, 6.75.

Nevada.—Fort McDermitt, 52.50; Truckee, 10.50; Otego, 10; Palisade, 10; Carlin, 6; Reno, 5; Wells, 5.

New Hampshire.—Mount Washington, 41.50; Grafton, 24; Antrim, 13.50; New Market, 12.50.

New Jersey.—Cape May, 17.50; Bordentown, 14.50; South Orange, 13.50; Atlantic City, 13; Little Egg Harbor, 13; Barnegat, 7; Sandy Hook, 6.

New Mexico.—Silver City, 14; Santa Fé, 4.25.

New York.—Palermo, 33.75; North Volney, 30; Vineland, 20.75; Port Jervis, 19; White Plains, 18; Albany, about 17; Johnstown, 16.75; Flushing, 16.50; Palermo, 15.50; Freehold, 13.75; Moorestown, 13.75; Ardenia, 13; Cooperstown, 12.25; Penn Yan, 11.25; Mountsville, 10.75; Friendship, 9.25; Oswego, 9.25; Factoryville, 8.50; Ithaca, 8.50; New York City, 8.25; Buffalo, 6.50; Rochester, 5.25.

North Carolina.—Murphy, 9; Highland, 8; Ore Knob, 7.50; Weldon, 5; Chapel Hill, 4.50.

Ohio.—New Athens, 16.25; North Lewisburg, 16; Columbus, about 13; College Hill, 12; Canal Dover, 10; Marion, 7.50; Ruggles, 7; Toledo, 6.50; Cleveland, 6; Westerville, 5; Bethel, 4.

Oregon.—Eola, 4.50.

Pennsylvania.—Grampian Hills, 25; Wellsboro, 21.75; Erie, 15.50; Germantown, 15.50; Dyberry, 14; Fallsington, 14; Philadelphia, 13.50; Catawissa, 12.75; Williamsport, 12.50; Chambersburg, 11.75; Pittsburg, 10; West Chester, 10.

Rhode Island.—Newport, 12.

Tennessee.—Knoxville, 6; Chattanooga, 3.50; Austin, 3.25.

Utah.—Corinne, 10; Salt Lake City, 10; Ogden, 7; Promontory, 5.

Vermont.—Strafford, 36; Lunenburg, 20.50; Newport, 14; Charlotte, 8.

Virginia.—Johnsontown, 13; Lynchburg, 9.25; Variety Mills, 9.25; Accotink, 9.25; Norfolk, 8.50.

West Virginia.—Helvetia, 21; Morgantown, about 17.

Wisconsin.—Neillsville, 32.50; Embarrass, 28.50; Franklin, 28; Manitowoc, 24.25; Milwaukee, 16.50; Ripon, 16.50; Beloit, 15; La Crosse, 13.50; Madison, about 10.

Wyoming.—Cheyenne, 8.75.

DEPTH OF UNMELTED SNOW ON GROUND AT END OF MONTH.

[Expressed in inches.]

California.—Cape Mendocino, trace.

Colorado.—Pike's Peak, 4; West Las Animas, 1.25.

Connecticut.—Southington, 2; New London, trace.

Dakota.—Fort Stevenson, 10; Wicklow, 4.30; Bismarck, 4; Huron, 2; Morriston, 2; Alexandria, 1.80; Fort Bennett, trace.

Idaho.—Eagle Rock, 7.

Illinois.—Riley, 18; Morrison, 10; Peoria, 10; Champaign, trace; Chicago, trace; Springfield, trace.

Indiana.—Logansport, 3.35; Monticello, 1; Lafayette, 0.50; Indianapolis, trace; Wabash, trace.

Iowa.—Independence, from 6 to 10; Humboldt, 20.6; Ames, 20; Cresco, 18; Des Moines, 14; Indianola, 14; Monticello, 11; Guttenburg, 10; Muscatine, 8.50; Cedar Rapids, about 8; Dubuque, 6; Clinton, 5; Des Moines, 3; Keokuk, 2; Davenport, 1.

Kansas.—Pretty Prairie, 2.

Maine.—Gardiner, 19; Orono, 14; Eastport, 11; Portland, 4.

Maryland.—Emmitsburg, about 3; Baltimore, trace; Sandy Springs, trace.

Massachusetts.—Mendon, 3; Westborough, 3; Charlestown, 1; Somerset, trace.

Michigan.—Northport, 53; Traverse City, 30; Hastings, 28; Marquette, 28; Mackinac City, 18; Grand Haven, 8.50; Alpena, 6; Escanaba, 6; Lansing, 5; Thornville, 5; Hillsdale, 4; Litchfield, 3; Port Huron, trace.

Minnesota.—Saint Paul, 19; Moorhead, 16; Duluth, 14; Saint Vincent, 7.

Missouri.—Bedford, 1.

Montana.—Fort Assiniboine, 12; Fort Keogh, 10; Billings, 9; Helena, 6; Fort Missoula, 4; Fort Shaw, 2; Fort Benton, 1.50.

Nebraska.—North Platte, 6; De Soto, 5; Genoa, 3; Lincoln, 3; Omaha, trace; Utica, trace.

New Hampshire.—Mount Washington, 24; Grafton, 23; New Market, 4.50.

New Jersey.—Atlantic City, trace; Bordentown, trace; Freehold, trace; Paterson, trace.

New Mexico.—Santa Fé, trace to 6.

New York.—Palermo, 25; Oswego, 11; Cooperstown, 8; Factoryville, 3; Penn Yan, 3; Buffalo, 2; Rochester, 2; Albany, 1; Flushing, 1.

Ohio.—Canal Dover, trace to 3; New Athens, 1.50; Bethel, 0.50; Cleveland, 0.50; Toledo, 0.50; North Lewisburg, trace; Sandusky, trace.

Oregon.—Umatilla, 7.

Pennsylvania.—Grampian Hills, 14; Wellsborough, 14; Dyberry, 10; Erie, 6; Chambersburg, 5.50; State College, 4; Williamsport, 4; Catawissa, 3; West Chester, 2.

Vermont.—Strafford, 36; Woodstock, 27.

Washington Territory.—Olympia, 1.50.

West Virginia.—Helvetia, 3.

Wisconsin.—Embarrass, 42; Neillsville, 28; Franklin, 24; Ripon, 17; Beloit, 12; La Crosse, 12; Madison, 7; Milwaukee, 4.

Wyoming.—Cheyenne, 24.

The figures given above are as reported by the observers.

SNOW FROM A CLOUDLESS SKY.

Burlington, Vermont, 5th, 6th, 8th, 9th. Springfield, Illinois, 8th, light snow fell during the night, and continued until 7.15 a. m. The clouds disappeared at 6.20 a. m., leaving the sky with a hazy appearance from which snow continued to fall. Wicklow, Dakota, 28th, snow fell from a cloudless sky from 8.15 to 8.40 p. m.

SLEET.

Alabama.—Green Spring, 21st.

Arizona.—Fort Verde, 19th.

Arkansas.—Fort Smith, 15th, 19th; Little Rock, 15th, 20th.

Connecticut.—New Haven, 17th.

Georgia.—Quitman, 22d.

Illinois.—Cairo, 19th, 20th; Champaign, 20th; Chicago, 12th, 13th; Springfield, 16th, 20th.

Indiana.—Indianapolis, 4th, 5th, 12th; Laconia, 4th; Logansport, 13th; New Harmony, 4th; Vevay, 4th, 13th, 25th.

Iowa.—Dubuque, 26th.

Kansas.—Fort Scott, 3d, 4th; Yates Centre, 16th.

Kentucky.—Louisville, 4th, 12th.

Louisiana.—Shreveport, 20th.

Maine.—Cornish, 20th; Eastport, 7th.

Michigan.—Detroit, 1st; Grand Haven, 26th.

Missouri.—Springfield, 20th.

Montana.—Fort Keogh, 25th.

New York.—Albany, 27th; Fort Columbus, 14th, 20th; New York City, 7th; Plattsburg Barracks, 21st.

North Carolina.—Charlotte, 9th; Weldon, 16th.

Ohio.—Bethel, 13th; Cincinnati, 4th, 8th; Cleveland, 19th, 26th; College Hill, 5th; Columbus, 8th, 28th; Portsmouth, 4th; Sandusky, 12th, 13th, 27th; Toledo, 12th, 13th.

Oregon.—Umatilla, 23d.

Pennsylvania.—Chambersburg, 13th, 19th; Philadelphia, 6th; Pittsburg, 13; West Chester, 6th; Williamsport, 17th.

Rhode Island.—Newport, 17th; Point Judith, 6th, 7th.

Tennessee.—Chattanooga, 1st; Nashville, 3d, 10th, 13th, 15th.

Texas.—Palestine, sleet fell from midnight of the 19th to 6.55 a. m. of 20th, covering the ground with ice to a thickness of four inches. Sleet also fell on the 1st; Brownsville, 21st, 22d; Fredericksburg, 2d; Galveston, 20th; New Ulm, 19th; San Antonio, 19th.

Vermont.—Burlington, 20th, 21st.

Virginia.—Chincoteague, 26th; Norfolk, 4th.

West Virginia.—Morgantown, 8th.

Wisconsin.—Madison, 26th; Milwaukee, 26th.

WINDS.

The most frequent directions of the wind during the month of January, 1883, for the Signal Service stations, are shown on chart iii., by arrows flying with the wind. In the lake region, they are from the west and southwest; in the extreme northwest, the upper Mississippi and Missouri valleys, they are from the northwest; in the southern states, they are generally from the north and northwest; along the Atlantic coast, they are from northwest to northeast; they are southerly in the north Pacific coast region, and generally from north and northwest in California.

TOTAL MOVEMENTS OF THE AIR.

[In miles.]

The following are the largest total movements at the Signal

Service stations: On the summit of Mount Washington, New Hampshire, 27,561; Delaware Breakwater, Delaware, 11,737; Sandy Hook, New Jersey, 11,727; Barnegat, New Jersey, 11,705; Block Island, Rhode Island, 11,598; Cheyenne, Wyoming, 11,183; Kittyhawk, North Carolina, 11,063; Indianola, Texas, 11,029; Hatteras, North Carolina, 10,976; Cape May, New Jersey, 10,886; Moorhead, Minnesota, 10,699; Rochester, New York, 10,301; Buffalo, New York, 10,261; Cape Mendocino, California, 10,077, (21 days); Sandusky, Ohio, 10,037; Champaign, Illinois, 9,929; Pike's Peak, Colorado, 9,538; Port Eads, Louisiana, 9,412; Grand Haven, Michigan, 9,206; Mackinac City, Michigan, 9,161; Eastport, Maine, 9,104; Marquette, Michigan, 9,071; Provincetown, Massachusetts, 8,997; Fort Sill, Indian Territory, 8,790; Saint Louis, Missouri, 8,783; Detroit, Michigan, 8,750; Oswego, New York, 8,725; Cape Henry, Virginia, 8,614; Fort Shaw, Montana, 8,431; Chincoteague, Virginia, 8,344; Erie, Pennsylvania, 8,225; Fort Assinibone, Montana, 8,216; Alpena, Michigan, 8,143; Fort Stevenson, Dakota, 8,137; Huron, Dakota, 8,017. The smallest are: Jacksonville, Florida, 1,853; Visalia, California, 1,862; Augusta, Georgia, 2,046; Roseburg, Oregon, 2,119; Silver City, New Mexico, 2,132; Salt Lake City, Utah, 2,333; Lynchburg, Virginia, 2,462; Lewiston, Idaho, 2,626; Tucson, Arizona, 2,640; Washington, District of Columbia, 2,675.

HIGH WINDS.

On the summit of Mount Washington, New Hampshire, velocities of 50 miles or more per hour occurred on all days during the month, with the exceptions of the following dates: 6th, 10th, 11th, 26th, 28th, 29th, 30th. The highest velocities recorded were as follows: 78, nw., 1st; 88, nw., 2d; 152, nw., 3d (maximum for month); 136, nw., 4th; 78, nw., 5th; 78, nw., 7th; 82, nw., 8th; 82, nw., 12th; 100, sw., 13th; 96, nw., 14th; 90, nw., 15th; 80, w., 18th; 114, se., 20th; 116, w., 21st; 81, nw., 22d; 100, nw., 24th; 78, nw., 25th; 81, nw., 27th; 110, s., 31st.

On the summit of Pike's Peak, Colorado, the highest velocities were: 72, nw., 2d (maximum for month); 64, nw., 6th; 60, w., 7th; 52, nw., 10th; 56, w., 11th; 60, w., 17th; 60, sw., 18th. Records incomplete from 12th to 14th and 19th to 31st.

At Cape Mendocino, California, they were: 56, nw., 17th; 58, nw., 18th; 58, se., 23d; 100 (estimated), se., 24th (maximum for month); 70, se., 28th. Records incomplete from 1st to 9th, 25th, 26th.

At Fort Maginnis, Montana, on the morning of the 12th, a hurricane prevailed, and from 3 to 7 a. m. the average velocity was 76 miles per hour.

Other stations reporting velocities 50 miles or more per hour are as follows: Fort Keogh, Montana, 61, nw., 29th; Indianola, Texas, 59, n., 8th; Fort Shaw, Montana, 58, sw., 9th; Billings, Montana, 56, nw., 12th; Duluth, Minnesota, 56, nw., 10th; Rochester, New York, 56, w., 21st; Fort Stevenson, Dakota, 54, nw., 9th; Barnegat, New Jersey, 52, ne., 10th; Block Island, Rhode Island, 52, ne., 10th; Cape Henry, Virginia, 52, n., 10th; Delaware Breakwater, Delaware, 52, n., 10th; Fort Assinibone, Montana, 52, sw., 8th; Fort Sill, Indian Territory, 52, n., 8th; Umatilla, Oregon, 52, n., 17th; Yankton, Dakota, 52, nw., 13th; Buffalo, New York, 50, sw., 21st; Moorhead, Minnesota, 50, n., 19th.

LOCAL STORMS.

New Orleans, Louisiana, 19th.—A severe thunder-storm prevailed here during last night, and was accompanied by a very heavy fall of rain. The streets were flooded and the planking torn up. The storm continued until 7.35 a. m.

San Francisco, California, 19th.—The very strong norther and high sea on the bay caused some damage to shipping interests in the northern part of the city. Brown's wharf at the foot of Mason street, was carried away; and a large lighter with two hundred and fifty tons of scrap-iron was capsized at the sea-wall. Several vessels were badly damaged by being driven against the wharves.

Fort Maginnis, Montana, 12th.—Hurricane from northwest

during the night. The wind attained an average velocity of seventy-six miles per hour from 3.00 to 7.00 a. m. Many buildings were unroofed or had their windows broken; much damage was caused by flying debris.

Cape Mendocino, California, 24th.—Very violent hurricane, the wind reaching an estimated velocity of one hundred miles per hour. The building was badly shaken, and anemometer cups were blown away.

Summit of Mount Washington, New Hampshire, 3d.—The wind increased to a violent hurricane, breaking off the anemometer at the dial. At the time the instrument was broken, a velocity of one hundred and fifty-two miles per hour was registered. It was impossible to replace the anemometer during the violence of the storm. In order to measure the rainfall, the observer was compelled to crawl to the rain-gauge, it being impossible to stand before the force of the wind. The storm continued during the 4th.

Oswego, New York, 21st.—During the early morning, the wind increased in force, attaining a velocity of forty-one miles per hour. The tin roof of a church was partly torn off, and the east wall of a mansard block, lately burned, was blown down. A few fences and trees were blown down. This storm occurred during the passage of low area xi.

Cheyenne, Wyoming, 29th.—Violent gale lasting eight hours; several buildings were more or less damaged. The wind attained a velocity of forty-nine miles per hour, filling the air with immense clouds of dust. The storm occurred during the passage of low area xvi.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for January, 1883, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 89.59 per cent. The percentages for the four elements are: Weather, 91.16; direction of the wind, 87.05; temperature, 90.90; barometer, 89.09 per cent. By geographical districts, they are: For New England, 89.93; middle Atlantic states, 90.60; south Atlantic states, 90.76; eastern Gulf, 90.40; western Gulf, 89.03; lower lakes, 89.51; upper lakes, 88.30; Ohio valley and Tennessee, 89.81; upper Mississippi valley, 90.08; Missouri valley, 87.79; north Pacific, 70.59; middle Pacific, 93.18; south Pacific, 93.18.

There were one hundred and twenty-one omissions to predict (thirty-two being due to the absence of reports from the Pacific coast,) out of 3,813, or 3.28 per cent. Of the 3,692 predictions that have been made, ninety-three, or 2.51 per cent., are considered to have entirely failed; forty-nine, or 1.35 per cent., were one-fourth verified; two hundred and seventy-four, or 7.42 per cent., were one-half verified; four hundred and seventy-one, or 12.75 per cent., were three-fourths verified; 2,805, or 75.97 per cent., were verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During January, 1883, one hundred and twenty-seven cautionary signals were displayed; of these, one hundred and four, or 81.1 per cent., were justified by winds of twenty-five miles or more, per hour, at or within one hundred miles of the station. Twenty cautionary off-shore signals were displayed; of these, fifteen, or 75.0 per cent., were fully justified, both as to direction and velocity; twenty, or 100 per cent., were justified as to direction, but not as to velocity. Two cautionary north-west signals were ordered, but were not justified either as to velocity or direction. One hundred and forty-nine signals of all kinds were displayed, of which one hundred and nineteen, or 79.87 per cent., were fully justified. Twenty-two signals were changed from cautionary to cautionary off-shore, and six signals were ordered late. The above numbers do not include signals ordered at sixty-nine display stations, where the velocity is only estimated.

One hundred and two cases of winds of twenty-five miles or more per hour were reported, for which no signals were ordered; most of these were high local winds or strong sea-breezes.

NAVIGATION.

STAGE OF WATER IN RIVERS.

The highest and lowest stages of water observed at the Signal Service stations, during the month of January, 1883, are shown in the following table:

Heights of rivers above low-water mark, January, 1883.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.	
		Date.	Height.	Date.	Height.
<i>Red River:</i>	<i>ft. in.</i>		<i>ft. in.</i>		<i>ft. in.</i>
Shreveport, La.....	29 9	21, 22	18 11	8	14 9
<i>Arkansas:</i>					
Little Rock, Ark.....		8	8 10	26, 27	1 0
Fort Smith, Ark.....		6	0 0	23	1-3 4
<i>Missouri:</i>					
Yankton, Dak.*.....	30 0				
Omaha, Nebr.*.....	16 0				
Leavenworth, Kans.*.....	21 0	8	5 4	1	3 5
<i>Mississippi:</i>					
Saint Paul, Minn.*.....	14 6				
La Crosse, Wis.*.....	18 0				
Dubuque, Iowa*.....	21 10				
Davenport, Iowa*.....	15 0				
Keokuk, Iowa*.....	14 6	1	13 10	3	12 8
Saint Louis, Mo.....	30 0	1	8 10	12	4 5
Cairo, Ill.....	40 0	30	30 7	9, 10	12 1
Memphis, Tenn.....	34 0	31	22 5	12	7 11
Vicksburg, Miss.....	41 0	31	23 7	1	11 8
New Orleans, La.....	-2 6	31	-9 4	1	-12 6
Port Eads, La.....		18	9 11	11	7 11
<i>Ohio:</i>					
Pittsburg, Pa.....	20 0	22	11 4	5	3 2
Cincinnati, Ohio.....	50 0	24	31 7	9	10 0
Louisville, Ky.....	24 0	25	13 3	10	6 0
<i>Cumberland:</i>					
Nashville, Tenn.....	42 0	24	30 4	4	4 8
<i>Tennessee:</i>					
Chattanooga, Tenn.....	31 0	24	38 8	4	3 10
<i>Monongahela:</i>					
Pittsburg, Pa.....	29 0	22	11 4	5	3 0
Morgantown, W. Va.....	28 0	17	15 2	13	1 2
<i>Savannah:</i>					
Augusta, Ga.....		22	30 10	4	7 5
<i>Willamette:</i>					
Portland, Ore.....		31	15 0	23	1 4
Umatilla, Ore.....		12, 13	3 5	5, 6	2 6
<i>Sacramento:</i>					
Red Bluff, Cal.....		25	2 10	15	1 1
Sacramento, Cal.....		20	12 2	23	8 1
<i>Mobile:</i>					
Mobile, Ala.....		20	18 0	9	14 9
<i>Colorado:</i>					
Yuma, Ariz.....		3, 4	16 4	30, 31	15 2

* Frozen. † Frozen part of month. See text. ‡ Below high-water mark of 1874.
§ Below bench-mark.

The Mississippi river remained frozen during the month at all stations north of Keokuk, Iowa; at that station it was frozen on and after the 4th. At Saint Louis, Missouri, the highest water was observed on the 1st; at Cairo, Illinois, on the 30th; at Memphis, Tennessee, Vicksburg, Mississippi, and New Orleans, Louisiana, on the 31st; and at Port Eads, Louisiana, on the 18th. It did not approach the danger-line at any of the stations named.

The Missouri river was frozen from the 1st to 31st, at Omaha, Nebraska, and at stations north of that place; at Leavenworth, Kansas, from the 9th to the close of the month; and at Brunswick, Missouri, after the 4th.

The Ohio river reached its highest stage from Pittsburg, Pennsylvania, to Louisville, Kentucky, between the 22d and 25th.

The Tennessee river at Chattanooga rose to thirty-eight feet, eight inches, on the 24th, or seven feet, eight inches, above the danger-line.

The Savannah river at Augusta, commenced to rise rapidly on the 6th, and on the 7th, had reached twenty-seven feet, after which it continued falling until the 17th; on the 18th, a second and sudden rise began, and on the 22d, rose above the danger-line to thirty feet, ten inches, but commenced falling during the night.

FLOODS.

Palestine, Texas, 26th.—Very heavy rain storm occurred at Huntsville, about ninety-two miles south of Palestine, on the Houston division of the International and Great Northern railroad, washing away a bridge and three cars.

Nashville, Tennessee, 21st.—The low-lands in the northern

part of the city are flooded to a depth of several feet; no damage has resulted.

Chattanooga, Tennessee, 21st.—A rapid rise in the river has occurred, caused by melting snow in the mountains. At 3 p. m. the river rose to the danger-line (thirty-one feet above low-water). The river continued rising until the 24th, reaching a height of thirty-eight feet, eight inches, after which it fell rapidly; no damage resulted from the high-water. On the 25th, the river was again below the danger-line.

Augusta, Georgia, 22d.—The river rose to thirty feet, ten inches, causing suspension of operations at the cotton mills. The cellars in the lower parts of the city were flooded, resulting in much inconvenience and loss. On the 23d, the river began falling.

Weldon, North Carolina, 9th.—The Roanoke river rose to the level of its banks on this date, but began to recede during the night. 23d, the river has risen during the past few days, and has overflowed the adjacent bottom-lands. The mills have been compelled to suspend operations on account of the high water. The river reached its highest point at noon of this date, and began falling.

HIGH-TIDES.

During the progress northeast along the coast of low pressure vii, the northeasterly winds in its front produced high-tides, as follows:—

Cape Lookout, North Carolina, 9th, 10th; Portsmouth, North Carolina, 9th, very high, island covered; Ocean City, Maryland, 10th; Cape May, New Jersey 10th; Sandy Hook, New Jersey, 10th, 11th.

LOW-TIDES.

During the 8th, a severe norther prevailed along the western Gulf coast, and produced at Indianola, Texas, on the 9th, very low tide; small vessels of light draught were unable to pass out of the bayou.

ICE IN RIVERS AND HARBORS.

New Haven harbor.—New Haven, Connecticut: 23d, harbor frozen with the exception of a narrow passage opened by steamboats.

Narragansett bay.—Narragansett Pier, Rhode Island: 28th, 29th, and 30th, large fields of ice passed out of bay.

Newport, Rhode Island: 24th, considerable ice formed in harbor during night; 25th, ice melting, harbor nearly clear.

Casco bay.—Portland, Maine: 11th, ice forming in harbor; 13th, harbor nearly filled with ice; 14th, ice broken up in harbor.

Thames river.—New London, Connecticut: 25th to 29th, ice formed around the docks.

Block Island harbor.—Block Island, Rhode Island: 23d, harbor frozen, but vessels were not prevented from passing through.

New York harbor.—New York City: 12th, floating ice; 14th and 16th, ice in harbor; 23d, 24th, and 25th, floating ice; 27th, very thick ice in harbor.

Lake Champlain.—Burlington, Vermont: 5th, navigation closed; 23d, lake frozen inside the breakwater; 26th, lake frozen over, being an earlier closing than for many years.

Saint Croix river.—Calais, Maine: 26th, the river is frozen from the lower steamboat wharf to Red Beach, nine miles below, for the first time in many years.

Hudson river.—Newburg, New York: 12th, the river is frozen over at this place; ice from three to five inches thick.

Barnegat bay.—Barnegat, New Jersey: 11th, the strong ebb-tide loosened a large ice-floe at the head of the bay, which in passing down struck the schooner "Margaret Amelia," breaking both anchor chains; she was run ashore and will prove a total loss, excepting the cargo.

Niagara river.—Niagara Falls, Ontario: 22d, an ice bridge formed on this date. During its formation, the ferryman's house was lifted and turned over on its side. Forty feet of the inclined railroad on the American side were torn away and buried beneath the ice. Fort Niagara, New York: 22d, river frozen over.

Patapsco river.—Baltimore, Maryland, 24th: navigation interrupted to some extent by ice in the harbor and river; 27th, ice broken up by boats, navigation unobstructed; 30th, considerable ice was driven by wind from the bay into the harbor and river, causing interruption to navigation.

Monongahela river.—Pittsburg, Pennsylvania: 19th, river full of floating ice at this place, and reported to be breaking in the upper Monongahela; 23d, ice passed out without causing damage.

Morgantown, West Virginia: 4th, river frozen over below the suspension bridge; 12th to 14th, river frozen; 15th, 16th, and 18th, ice-gorge; 19th, ice broken up and moved out.

New Geneva, Pennsylvania: 12th, heavy floating ice, boats stopped; 23d, 24th; 25th, and 28th, heavy floating ice.

Ohio river.—Pittsburg, Pennsylvania: 20th, large quantities of ice running, river rising rapidly; 21st, coal barges were compelled to leave during the morning to prevent destruction by the ice.

Louisville, Kentucky: 18th, navigation which had been partly suspended on account of floating ice since the 11th was resumed on this date.

Cincinnati, Ohio: 14th, 15th, 16th, floating ice in river.

Cairo, Illinois: 12th to 28th, light flow of ice, not sufficient to interrupt navigation.

Vevay, Indiana: 27th, floating ice.

Portsmouth, Ohio: 14th, 15th, 25th, 26th, 27th, floating ice, obstructing navigation on the last-mentioned date.

Wheeling, West Virginia: 3d to 7th, floating ice; 15th to 20th, ice-dam; 21st, ice broke up in river, no damage resulted.

Tennessee river.—Paducah, Kentucky: 11th to 26th, floating ice in river.

Youghiogheny river.—Confluence, Pennsylvania 14th: to 31st, river frozen.

Lake Erie.—Cleveland: 1st, lake frozen along the shore; 4th, lake frozen as far as the eye can reach; 17th, ice on lake seventeen inches thick.

Detroit river.—Detroit, Michigan: 1st to 12th, heavy masses of floating ice; 13th to 29th, solid ice; 21st, ice from three to four feet in thickness; 30th, ice began to move at 3 p. m.; 31st, southerly winds drifted the ice along the Detroit shore, leaving the Canadian shore clear until after noon, when it again extended from shore to shore, being piled up in places to a height of twelve feet.

Oswego river.—Oswego, New York: 10th, river frozen from the railroad bridge to the mouth.

Mackinac straits.—Mackinac City, Michigan: 4th, straits partly frozen over; 5th, ice drifted along the shores by the wind; 6th, ice blown out of straits; 7th, the schooner "Fleetwing" put in port, having been badly damaged by ice; 8th, straits frozen over; 10th, ice broken up and blown out by wind; 11th, 12th and 13th, straits full of ice; 14th, straits frozen over, steamer "Algolah" stuck in middle of straits; 16th, teams crossing on ice.

Little Bay de Noquet.—Escanaba, Michigan: 31st, bay frozen throughout the month.

Grand river.—Grand Haven, Michigan: 4th, river frozen over; 12th, river clear of ice; 14th, heavy masses of drift ice have appeared at mouth of river and is pushing up the stream, rendering navigation very unsafe; 15th, river again closed by drift ice, and in the lower part of the river the ice is reported to extend from six to twelve feet below the surface; 21st, river frozen; 22d, steamer "Wisconsin" ice-bound and compelled to remain at her moorings.

Saint Clair river.—Port Huron, Michigan: 4th to 8th, heavy ice in river; 22d and 23, river frozen firmly from shore to shore opposite this city; 25th, pedestrians crossing on the ice.

Lake Huron.—Port Huron, Michigan: 9th, a large ice bridge formed at the base of the lake, and extended diagonally across from Fort Gratiot light-house to Point Edwards, on the Canadian shore; it broke on the 12th and formed again on the 16th.

Lake Superior.—Duluth, Minnesota: 2d, lake frozen for a distance of half a mile from shore; 7th, ice carried out by the

wind during the evening; 12th, large fields of ice blown in by the wind; 13th, ice again blown out; 14th, lake frozen; 21st, all ice carried out, except for a distance of about five hundred feet inside the breakwater; 24th, lake frozen as far as the eye can reach.

Marquette, Michigan: 3d, harbor frozen over.

Mississippi river.—Davenport Iowa: 31st, the river remained frozen at this place and at all points above throughout the month.

Dubuque, Iowa: 3d, the ice in the channel measured eight inches in thickness.

Cairo, Illinois: 31st, heavy flow of ice in the Mississippi during the month with occasional gorges; navigation closed north of this city.

La Crosse, Wisconsin: 30th, ice in river measures twenty-eight inches.

Keokuk, Iowa: 4th, river frozen over; 11th, teams crossing on the ice.

Saint Louis, Missouri: river full of floating ice on 2d, 3d, 5th, 6th, 7th, 9th, 10th to 16th, 21st, 23d to 29th; 30th, river clear, navigation resumed.

Clinton, Iowa: 31st, ice in river from twenty to twenty-six inches thick.

Muscataine, Iowa: 1st, ice six inches thick in channel, teams crossing; 31st, ice twenty inches thick.

Saint Paul, Minnesota: 15th, ice in river twenty-one inches thick.

Missouri river.—Leavenworth, Kansas: 1st to 8th, floating ice; 9th to 31st, river frozen.

Saint Joseph, Missouri: 31st, river frozen at this place, and at all points north throughout the month.

Brunswick, Missouri: 4th to 31st, river frozen.

Yellowstone river.—Fort Keogh, Montana: river frozen over during night of the 8th.

Willamette river.—Umatilla, Oregon: 2d, river frozen along the shores to a thickness of three inches; 1st, 3d, 4th, 17th and 18th, floating ice; 31st, during the past week, ice from eight to ten inches thick has been cut in the river.

Sacramento river.—Sacramento California: 20th, ice on the bars in river sufficiently thick to bear the weight of boys.

Folsom City, California: 20th, floating ice; very unusual occurrence at this place.

Embarrass river.—Charleston, Illinois: 31st, ice in river about ten inches thick.

Grand Traverse bay.—Northport, Michigan: 31st, bay entirely frozen over.

Kansas river.—Salina, Kansas: 20th, ice in river ten inches thick.

Topeka, Kansas: 31st, ice in river twelve inches thick.

Susquehanna river.—Catawissa, Pennsylvania: 31st, the north branch of the Susquehanna was closed during the month with ice from twelve to thirteen inches thick.

Arkansas river.—Little Rock, Arkansas: 22d, river reported to be frozen over sixty miles north, and is full of floating ice at this station.

Fort Smith, Arkansas: 9th, 21st, and 22d, floating ice in river.

Miscellaneous.—Wicklow, Dakota: 15th, ice on lake twenty-five inches thick; 31st, ice twenty-nine inches thick.

Thorntown, Michigan: 31st, ice on ponds in vicinity ten inches thick.

Port Huron, Michigan: 4th, ice harvested from Black river from eight to nine inches thick.

Palermo, New York: 31st, ice in ponds in vicinity twenty inches thick.

TEMPERATURE OF WATER.

The temperature of water as observed in rivers and harbors, at the Signal Service stations, with the average depth at which the observations were made, are given in the table below. In this table are also shown the highest and lowest observed water temperatures of the month, with the monthly ranges, and the monthly mean temperature of the air for the various stations.

At the following stations no observations were made during the month, on account of ice: Alpena, Michigan; Buffalo, New York; Chicago, Illinois; Cleveland, Ohio; Detroit, Michigan; Escanaba, Michigan; and Sandusky and Toledo, Ohio. Observations, were interrupted on account of ice formation at other stations as follows: Grand Haven, Michigan, from 4th to 11th, and from 21st to 31st; Milwaukee, Wisconsin, from 2d to 31st; New London, Connecticut, from 25th to 31st; Mackinac City, Michigan, from 2d to 4th, and from 8th to 31st; Marquette, Michigan, from 3d to 31st; Duluth, Minnesota, from 2d to 7th, 9th, 12th, and from 14th to 31st. At Indianola, Texas, the instrument was broken on the 14th, and no observations were made after that date.

Temperature of Water for January, 1883.

STATION.	Temperature at bottom		Range.	Average depth, feet and inches.	Mean temperature of the air at station.
	Max.	Min.			
Atlantic City, New Jersey	36.5	34.6	1.9	ft. in.	39.0
Alpena, Michigan*	52.0	41.5	10.5	16 0	49.2
Augusta, Georgia	34.5	31.0	3.5	10 0	32.3
Baltimore, Maryland	36.8	30.3	6.5	9 7	29.9
Block Island, Rhode Island	33.8	28.8	5.0	25 0	25.1
Boston, Massachusetts	69.0	46.0	23.0	8 5	58.5
Buffalo, New York*	51.9	47.1	4.8	40 10	51.4
Cedar Keys, Florida	40.0	29.0	11.0	5 8	33.5
Charleston, South Carolina	38.4	31.7	6.7	5 2	31.6
Chicago, Illinois*	34.0	32.4	1.6	15 9	1.8
Chincoteague, Virginia	37.8	33.3	4.5	17 0	16.2
Cleveland, Ohio*	54.0	36.0	18.0	14 8	51.0
Detroit, Michigan*	28.8	28.0	0.8	19 0	20.4
Delaware Breakwater, Delaware	53.1	44.1	9.0	8 3	49.5
Duluth, Minnesota*	60.0	52.0	8.0	18 0	52.9
Eastport, Maine	78.6	68.0	10.6	16 3	72.3
Escanaba, Michigan*	32.5	32.0	0.5	13 0	16.0
Galveston, Texas	34.0	34.0	0.0	10 6	12.3
Grand Haven, Michigan*	31.6	31.6	0.0	8 0	12.7
Indianola, Texas*	55.5	47.0	8.5	16 4	52.7
Jacksonville, Florida	35.0	29.7	5.3	15 1	23.8
Key West, Florida	39.0	33.0	6.0	13 0	26.6
Mackinac City, Michigan*	35.2	29.7	5.5	10 5	27.6
Marquette, Michigan*	35.7	29.7	6.0	10 10	27.8
Milwaukee, Wisconsin*	42.0	34.0	8.0	17 4	39.1
Mobile, Alabama	59.3	49.8	9.5	17 1	54.5
New Haven, Connecticut	34.5	30.0	4.5	18 9	21.4
New London, Connecticut	41.5	31.4	10.1	50 2	37.6
Newport, Rhode Island	48.2	42.3	5.9	9 2	58.6
New York City	38.0	31.0	7.0	14 0	29.1
Norfolk, Virginia	74.0	60.6	13.4	10 10	66.2
Pensacola, Florida	36.3	31.1	5.2	1 8	28.4
Portland, Maine	49.4	46.8	2.6	31 6	46.5
Portland, Oregon	50.0	45.6	4.4	14 3	54.2
Port Eads, Louisiana	49.0	43.0	6.0	10 0	45.8
Provincetown, Massachusetts					
Punta Rassa, Florida					
Sandusky, Ohio*					
Sandy Hook, New Jersey					
San Francisco, California					
Savannah, Georgia					
Smithville, North Carolina					
Toledo, Ohio*					
Wilmington, North Carolina					

* Observations wanting, see text.

The largest monthly ranges of water temperature are: Cedar Keys, Florida, 23°; Galveston, Texas, 18°; Punta Rassa, Florida, 13°; Chincoteague, Virginia, 11°. The smallest are: Atlantic City, New Jersey, 1°; San Francisco, California, 2°; Baltimore, Maryland, 3°; Wilmington, North Carolina, 4°; Savannah, Georgia, 4°; Eastport, Maine, 4°; Portland, Maine, 4°.

ATMOSPHERIC ELECTRICITY.

AURORAS.

But few auroral displays occurred during the month, none of which were noted for brilliancy or extent of observation. The display of the 26th was the most generally observed, and this was reported by but few observers, all in New England; they are as follows:—

Eastport, Maine, 26th.—Faint auroral light observed from 7 to 9 p. m.

Mount Washington, New Hampshire, 26th.—At 7.10 p. m., an aurora was observed, consisting of rays of whitish light, emanating from a dark segment of about 4° altitude. Streamers rose to a height of from 7° to 12° above the dark segment. The display was most brilliant in the north-northeastern sky, and ended at 9.45 p. m., leaving a luminous cloud.

Burlington, Vermont, 26th.—An aurora was observed from

10.00 to 10.30 p. m., consisting of broad bands of white light, which extended across the sky from southeast to northwest.

Provincetown, Massachusetts, 26th.—Faint auroral display observed from 7.30 to 9.00 p. m.

The other displays reported as follows:—

Eastport, Maine, 5th.—Faint auroral light of pale straw-color, observed at 7.00 p. m.; the display continued until early morning of the 6th.

Alexandria, Dakota, 5th.—Aurora consisting of faint luminous beams extending to an altitude of 30°, with an arch and dark segment beneath. The display was first observed at 8.00 p. m., was brightest at 9.00, and very faint at 10.00 p. m.

Northfield, Minnesota, 6th.—A faint auroral light was observed from 3.00 to 5.00 a. m. A faint display was also observed at 5.00 a. m. of the 7th, extending upward 40° in the northeastern sky.

Gardiner, Maine, 7th.—Faint aurora observed after 11.00 p. m., was still visible without change at 2.00 a. m. of the 8th.

Escanaba, Michigan, 7th.—Faint aurora in the northern sky at 9.30 p. m.; it consisted of a diffuse pale-green light with the usual dark base.

Vevay, Indiana, 9th.—Faint aurora observed at 8.30 p. m.

Clinton, Missouri, 10th.—Faint auroral light in the north, at 8.30 p. m.

Kittyhawk, North Carolina, 15th.—An aurora of light silvery-color was observed from 11.15 to 11.28 p. m., causing interruption to telegraphic communication during its presence.

Canal Dover, Ohio, 20th.—Aurora observed at 9.00 p. m.

Terry's Landing, Montana, 23d.—Faint aurora from 6.30 to 7.30 p. m.

Rowe, Massachusetts, 25th.—Aurora observed from 7.00 to 9.00 p. m.

ATMOSPHERIC ELECTRICITY INTERFERING WITH TELEGRAPHIC COMMUNICATION.

Vicksburg, Mississippi, 16th.—During the evening, the telegraph lines were charged with atmospheric electricity, causing the wires to work badly.

Fort Keogh, Montana, 20th.—An electric storm began at 6.10 p. m. and continued until after midnight. The telegraph wires were worked, although the line was open both east and west of station, and continuous sparks were emitted from the switch-board.

Fort Maginnis, Montana, 12th.—During the prevalence of a violent hurricane on this date, a very remarkable electrical phenomenon was observed. The metallic parts of the telegraph-instruments were enveloped in a brilliant bluish light, and emitted a sharp snapping noise. The current was so powerful as to burn the hard rubber on the instruments, and fuse the brass on the lightning-arrester. The phenomenon was also observed at other places. All reports state that metallic points, &c., were tipped with light.

Visalia, California, 1st.—The telegraph-wires were affected by atmospheric electricity on this date.

THUNDER-STORMS.

Thunder-storms were reported in the various districts on the following dates:—

New England.—31st.

Middle Atlantic states.—31st.

South Atlantic states.—17th, 19th, 27th, 28th, 29th.

Florida peninsula.—7th, 8th, 9th, 14th, 25th.

Eastern Gulf.—6th, 13th, 15th to 20th, 27th, 28th.

Western Gulf.—3d, 6th, 7th, 13th to 20th, 26th, 27th.

Tennessee.—18th, 20th.

Ohio valley.—20th.

Missouri valley.—12th, 13th, 20th.

Southern slope.—Fort Concho, Texas, 2d, 26th.

The following instances of damage by lightning have been reported:—

Brooklyn, New York, 31st.—A house in this city was struck by lightning; three windows were broken; furniture and chandeliers were damaged, and one person seriously stunned.

Mobile, Alabama, 19th.—A cotton house and residence was struck by lightning and set on fire during thunder-storm of this date.

New Orleans, Louisiana, 19th.—Several buildings and trees were struck by lightning during the thunder-storm of this date; in one instance a house was set on fire and damaged to a considerable extent. The top-gallant-mast of the bark "Unga" was shattered by lightning.

Buffalo, Texas, 19th.—A house was struck by lightning on this date, and six of the inmates were severely shocked.

Fort Scott, Kansas, 12th.—During thunder-storm, a barn near this place was struck by lightning and burned, together with a large amount of hay and grain, and some live-stock.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos have been observed in the various districts, on the following dates:—

New England.—4th, 9th, 11th, 12th, 13th, 16th, 18th, 19th.

Middle Atlantic states.—3d, 4th, 10th, 11th, 12th, 18th, 24th, 25th, 31st.

South Atlantic states.—2d, 3d, 8th, 13th, 15th, 18th, 28th, 29th.

Ohio valley and Tennessee.—9th, 12th, 14th, 15th, 16th, 18th, 21st, 22d, 30th, 31st.

Lower lakes.—4th, 10th, 11th, 15th, 24th, 26th, 30th.

Upper lakes.—1st, 4th, 8th, 9th, 10th, 14th, 16th, 18th, 22d, 23d.

Extreme northwest.—2d, 3d, 4th, 6th, 10th, 13th, 17th, 25th, 26th.

Upper Mississippi valley.—1st, 2d, 3d, 7th to 15th, 18th to 22d, 25th, 27th, 30th, 31st.

Missouri valley.—1st, 2d, 5th, 6th, 8th, 9th, 12th, 13th, 14th, 17th, 19th, 22d, 30th.

California.—11th, 13th, 14th, 18th, 25th, 26th, 28th.

Solar halos were also reported from the following stations, not included in the districts named above:—

Key West, Florida, 2d, 16th; Palestine, Texas, 11th, 14th, 17th, 18th, 28th to 30th; Fort Keogh, Montana, 14th, 21st, 28th; Creswell, Kansas, 2d, 19th; Salina, Kansas, 20th; Yates Centre, Kansas, 11th, 31st; Santa Fé, New Mexico, 20th.

Mr. Henry White, at Fargo, Dakota, reports interesting halos and parhelia, observed by him at that point on the morning of the 13th of January (the hour is not specified). A horizontal band of light extended through the sun, indefinitely to the right and left, and a vertical band extended to an altitude of apparently 45° ; circular halos surrounded the sun, the inner one apparently having the ordinary angular radius of $22\frac{1}{2}^\circ$, and beyond this, one of 45° ; a fragmentary arc parallel to these circles existed in the upper portion of the space between them; at the intersection of the circles and horizontal band, parhelia were observed. Excepting the presence of the vertical band and fragmentary arc, this system of halos and parhelia was as is represented in paragraph 428, Loomis's Meteorology.

LUNAR HALOS.

Lunar halos have been observed in the various districts, on the following dates:—

New England.—1st, 15th, 18th, 25th, 26th, 27th.

Middle Atlantic states.—4th, 11th, 13th to 16th, 18th, 21st to 24th, 31st.

South Atlantic states.—13th, 15th, 17th to 20th, 25th.

Eastern Gulf.—1st, 3d, 11th, 17th, 20th, 21st, 31st.

Western Gulf.—2d, 14th, 16th to 21st, 31st.

Ohio valley and Tennessee.—11th, 12th, 14th to 26th, 30th.

Lower lakes.—11th, 15th, 16th, 19th, 21st, 23d.

Upper lakes.—1st, 13th to 19th, 22d to 26th, 29th.

Extreme northwest.—14th, 17th, 18th, 20th, 21st, 23d, 25th.

Upper Mississippi valley.—1st, 13th, 14th, 17th to 22d, 24th, 25th, 26th, 31st.

Missouri valley.—13th, 14th, 17th to 20th, 22d to 25th, 27th, 28th.

Northern slope.—13th to 21st, 24th, 25th.

Southern slope.—11th, 19th, 20th, 31st.

Southern plateau.—2d, 4th, 11th, 13th, 14th, 27th.

California.—3d, 22d, 24th, 25th, 26th, 30th.

Lunar halos were also reported from the following stations, not included in the districts named above:—

Cedar Keys, Florida, 16th, 17th; Eagle Pass, Texas, 17th, 18th, 20th, 24th, 28th; Pike's Peak, Colorado, 20th; Yates Centre, Kansas, 22d; Salt Lake City, Utah, 21st; Pioche, Nevada, 1st, 13th, 14th; Umatilla, Oregon, 12th; Roseburg, Oregon, 21st.

MIRAGE.

Wicklów, Dakota, 1st.—At sunrise the horizon between the sw., and wsw., appeared from ten to fifteen feet higher than its natural position.

Pretty Prairie, Kansas, 21st.

Genoa, Nebraska, 24th, 27th, 28th, 29th.

Indianola, Texas, 7th, 9th, 14th, 16th, 22d, 23d.

Portsmouth, North Carolina, 17th.—Captain Fisher of the schooner "Sophia Hanson," which went ashore near Ocracoke on the 16th, states that the disaster was due in part to the effects of mirage.

MISCELLANEOUS PHENOMENA.

SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and sixty-nine stations show 5,176 observations to have been made, of which twenty-one were reported doubtful; of the remainder, 5,155, there were 4,341, or 84.2 per cent., followed by the expected weather.

SUN SPOTS.

The following record of sun spots for the month of January, 1883, has been forwarded by Mr. D. P. Todd, Director of the Lawrence Observatory, Amherst, Massachusetts:—

DATE— Jan., 1883.	No. of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		REMARKS.
	Grps	Spots	Grps	Spots	Grps	Spots	Grps	Spots	
8, 12 m.	.....	.....	.....	.....	.....	.....	2	7	
11, 12 m.	1	6	.....	.....	1	6	1	6	
12, 12 m.	1	5	0	0	1	5	2	12	
14, 1 p. m.	2	8	0	0	0	0	4	20	
15, 3 p. m.	1	10	0	0	1	5	5	30	
18, 11 a. m.	0	0	1	2	0	0	3	25	
22, 11 a. m.	1	3	.....	.....	1	3	5	20	Spots mostly small.
23, 9 a. m.	1	1	0	5	1	1	6	15	Do.
24, 9 a. m.	0	0	2	5	0	0	6	10	Do.
26, 12 m.	0	0	1	2	0	0	3	8	
30, 10 a. m.	1	1	.....	.....	.....	.....	3	6	

† Approximated. Faculae were seen at the time of every observation.

Wicklów, Dakota, 15.—At 4.15 p. m. a large oblong spot was observed on the sun's disc near the centre, with a group of spots toward the northwestern quadrant; a smaller spot was also observed about midway between the centre and upper edge.

North Lewisburg, Ohio.—Mr. H. D. Gowy reports: Sun spots were seen on all clear days during the month; they were most numerous on the 2d; least numerous on the 11th; largest on the 18th, and smallest at the close of the month.

METEORS.

A remarkably brilliant meteoric display occurred on the night of January 3d. The phenomenon was observed at stations in Wisconsin, Michigan, Missouri, Iowa, Illinois, Indiana and Ohio, and is generally described as having resembled a large, bright ball of fire. The following reports in connection therewith are of interest:—

Ohio.—Cincinnati: At about 7.00 p. m., 3d, a meteor of unusual size and brilliancy passed in a southwesterly direction from a point slightly east of north. The meteor was apparently as large as a man's head and resembled a ball of fire surrounded by a halo of light, which, in turn was surmounted by a circle of greenish color.

North Lewisburg, Champaign county: at 7.15 p. m., 3d, a meteor, resembling a small white star was observed to pass

from north to south at an elevation of 40° , and disappeared at that elevation. It left a trail resembling the tail of a comet; the train was from 1° to 3° in width and about 20° in length, and was visible for twenty minutes; before disappearing it assumed a serpentine shape.

Indiana.—Logansport, Cass county: At 7.05 p. m., 3d, a brilliant meteor passed over the city from east to west. It moved with a hissing noise like that of a rocket, and apparently exploded near the horizon, leaving a yellowish light in its trail.

Vevay, Switzerland county: At 6.55 p. m., 3d, a meteor of intense brilliancy passed over this place; its color was of a bluish tint, resembling the electric light. Its path was due southwestward, followed by a brilliant train whose luminous path was visible for ten seconds. The nucleus had the appearance of Venus, when about 10° above the horizon.

Monticello, White county: 3d, during the evening, a brilliant meteor was observed; it started from a point about 45° above the southeastern horizon and moved westward, leaving a train of whitish light, which remained visible for several minutes.

The phenomenon was also reported from the following places by observers of the Indiana State Weather Service: Fort Wayne, Allen county; Wabash, Wabash county; Monticello, White county; Logansport, Cass county; Huntington, Huntington county; Kokomo, Howard county; Farmland, Randolph county; Indianapolis; Bloomington, Monroe county; and Vevay, Switzerland county.

Illinois.—Champaign county: A very brilliant meteor was observed at about 6.40 p. m., 3d, at a point midway between the northeastern horizon and the zenith; during its passage across the sky, the whole heavens were lighted up for several seconds. The head of the meteor had the appearance of an electric light, and left a trail of a blood-red color. It is considered to have been the most brilliant meteor ever witnessed here.

Charleston, Coles county: At 6.45 p. m., 3d, a very brilliant meteor passed from east to west, leaving a long trail of various colors.

Riley, McHenry county: a meteor of unusual size and brilliancy passed across the heavens during the evening of the 3d.

Polo, Ogle county: At 6.50 p. m., 3d, a brilliant meteor was observed; it left a train which remained visible for one minute.

Clinton, DeWitt county: 3d, a meteor, resembling a ball of fire, passed from northeast to southwest over the city. It was apparently accompanied by a hissing sound, and left a crimson light in its wake.

Litchfield, Montgomery county: At 7.00 p. m., 3d, a large and brilliant meteor appeared in the northern sky; it moved from west to east and was of a vivid greenish-color. The meteor was also observed at Chicago; Morrison, Whitesides county, Hillsborough and Kokomis, Montgomery county.

Iowa.—Dubuque: At 6.48 p. m., 3d, a very brilliant meteor passed from east to west across the entire sky. It appeared to be about $30'$ in diameter and was of a bright yellow color.

Davenport: At 6.40 p. m., 3d, a very bright meteor was observed in the eastern sky, about 30° degrees above the horizon; it pursued a southwesterly course and disappeared in a bank of clouds near the horizon. The track of the meteor was marked by a line of red light which remained visible for about thirty seconds.

Muscatine, Muscatine county: at 6.45 p. m., 3d, a very brilliant meteor was observed.

Missouri.—Hanibal, Marion county: At 7.30 p. m., 3d, a brilliant meteor was observed just above the eastern horizon. It resembled a ball of fire of a bluish color and passed south-eastward, being visible for several seconds. It was described as having a rotary or circular motion.

Michigan.—Port Huron: At 7.30 p. m., 3d, a brilliant meteor was observed in the southwestern sky.

Mr. L. P. Alden, at Coldwater, Branch county, reported: "At about 7 p. m., city time, on Wednesday, January 3d, a

brilliant meteor appeared almost directly in the south, about 35° above the horizon, and shot in a straight line towards the southwestern horizon, where it disappeared. The light seemed to be as brilliant as that of a two-pound rocket, and was composed of various colors, green predominating. It was in sight from fifteen to twenty seconds and increased in brilliancy until it seemed to burst just above the horizon. The most remarkable feature of this meteor was the trail of light which it left behind, the upper half of which remained very plainly visible for half an hour. At first, this track of light was perfectly straight, but after a few moments, it assumed a serpentine form, and, later, the two ends of the line folded together and slowly floated a little to the east, remaining at nearly the same altitude until it faded away."

Wisconsin.—Madison: At 6.45 p. m., 3d, a large meteor, resembling an electric light in brilliancy and color, and illuminating the entire heavens, was observed to shoot from a point about 45° above the southeastern horizon. It passed downward and disappeared at a point about 10° above the southwestern horizon; a dark-red light remained for several minutes at the starting point, this light at first elongated in the direction taken by the meteor and afterwards gradually faded to an irregular rounded form.

Milwaukee: At 7.00 p. m., 3d, a very large and brilliant meteor was observed. It was observed at West Bend.

Meteors of less brilliancy were reported by the following stations:—

Yuma, Arizona, 5th, 12th, 28th.
Visalia, California, 7th.
San Francisco, California, 3d.
Alexandria, Dakota, 1st, 2d, 4th, 8th.
Punta Rassa, Florida, 26th.
Augusta, Georgia, 31st.
Morrison, Illinois, 2d, 8th, 13th.
Yates Centre, Kansas, 1st.
Fort Scott, Kansas, 1st.
Lansing, Michigan, 15th.
Saint Vincent, Minnesota, 23d.
Clinton, Missouri, 1st, 11th, 17th, 29th.
Freehold, New Jersey, 31st.
Williamsport, Pennsylvania, 30th.
Strafford, Vermont, 7th.
Franklin, Wisconsin, 8th.
Beloit, Wisconsin, 4th.

EARTHQUAKES.

Nashville, Tennessee, 11th.—A slight shock of earthquake was felt in this city between 1.15 and 1.20 a. m. Many of the inhabitants were awakened from its effects. The shock was also felt at Jackson, Tennessee, (seventy miles southwest of Nashville), and at points in northwestern Tennessee and southern Kentucky. At Clarksville, Tennessee, cooking utensils, toilet articles, etc., were displaced.

Memphis, Tennessee, 11th.—Three distinct shocks of earthquakes were felt in this city at 1.10 a. m., and were accompanied by a vibratory motion.

Cairo, Illinois, 11th.—Heavy shock of earthquake felt at 1.15 a. m., lasting fifteen seconds.

Anna, Illinois, 10th.—A slight shock of earthquake occurred at 2.25 p. m., lasting about ten seconds. At 1.20 a. m. of the 11th, quite a heavy shock was felt, which was preceded by a roaring sound like that of distant train. The shock was of about forty seconds duration; vibration from west to east.

Collinsville, Illinois, 11th.—Slight shock of earthquake felt here at 1.20 a. m.

Paducah, Kentucky, 11th.—A heavy shock of earthquake was felt at this place between midnight and 1.00 a. m.

St. Louis, Missouri, 11th.—Earthquake shock at 1.00 a. m. A gentle, swaying motion was felt, lasting less than one minute, the direction of vibration is not known.

Protem, Missouri, 10th.—Several persons in this and neighboring localities, report having felt a slight earthquake shock about 12 m.

Los Angeles, California, 23d.—Slight shock of earthquake at 5.00 a. m.; vibration from north to south. Two distinct shocks were felt, separated by an interval of about two seconds.

San Francisco, California, 23d.—Very sharp shock of earthquake of short duration, was felt here and in the surrounding country at 11.40 p. m. The direction of vibration was not determined.

Addison, Maine.—1st, Two shocks of earthquake were felt here during the morning; the first shock was felt at 2.58 a. m., and the second at 8.28 a. m.

SAND-STORMS.

Apache Pass, Arizona, 18th.

Yuma, Arizona, 18th.

Visalia, California, 1st.

West Las Animas, Colorado, 7th, 12th, 18th, 29th.

Fort Union, New Mexico, 7th, 29th, 30th, 31st.

El Paso, Texas, 16th, 18th, 19th.

POLAR BANDS.

Punta Rassa, Florida, 3d.

Yates Centre, Kansas, 2d, 24th, 26th, 30th.

Salina, Kansas, 30th.

Protem, Missouri, 17th, 23d.

Freehold, New Jersey, 23d.

Nashville, Tennessee, 14th, 15th, 17th, 31st.

Wytheville, Virginia, 2d, 12th, 14th, 15th, 21st, 22d, 25th, 26th.

Fort Myer, Virginia, 14th.

ZODIACAL LIGHT.

Little Rock, Arkansas, 25th.

New Haven, Connecticut, 31st.

Wicklow, Dakota, 1st to 5th, 8th, 9th, 10th, 15th, 27th, 28th, 30th, 31st.

Punta Rassa, Florida, 4th, 5th, 8th.

Springfield, Illinois, 28th, 30th, 31st.

Wabash, Indiana, 25th.

Clinton, Iowa, 1st, 2d, 3d, 6th, 8th.

Monticello, Iowa, 27th, 30th, 31st.

Yates Centre, Kansas, 9th, 10th.

Clay Centre, Kansas, 7th.

Orono, Maine, 20th.

Cornish, Maine, 2d.

Cambridge, Massachusetts, visible, 1st to 4th, 7th, 26th, 30th, 31st; suspected, 11th, 12th.

Somerset, Massachusetts, 1st, 2d, 3d, 26th, 30th, 31st.

Rowe, Massachusetts, 31st.

Clinton, Missouri, 1st, 9th.

Mountainville, New York, 31st.

Nashville, Tennessee, 9th, 23d, 24th, 26th, 29th.

Chattanooga, Tennessee, 24th.

New Ulm, Texas, 29th.

Palestine, Texas, 6th, 7th, 9th, 11th, 22d to 25th, 29th.

Variety Mills, Virginia, 27th, 29th, 30th.

Franklin, Wisconsin, 25th.

PRAIRIE FIRES.

Fort Supply, Indian Territory, 29th, 30th.

Creswell, Kansas, 9th, 10th, 31st.

Coleman City, Texas, 7th, 24th, 25th, 29th, 30th.

Fort Concho, Texas, 13th, 24th, 30th.

Fort Elliott, Texas, 12th.

Fort McKavett, Texas, 11th, 12th, 14th, 15th, 17th, 18th, 21st to 26th, 30th, 31st.

DROUGHT.

Bangor, Maine, 31st.—A drought of great severity prevails in this state; it is especially severe in this (Penobscot) county. All mills that are run by water-power have suspended operations. Springs and wells are now exhausted that were never before known to fail. Farmers suffer great inconveniences; in consequence of the drought snow is melted, and water is hauled long distances for stock and domestic purposes.

Charlotte, Vermont, 31st.—Great scarcity of water continues; the wells and streams are very low, necessitating farmers to melt snow for their stock.

Dyberry, Pennsylvania, 31st.—Many streams and wells are dry in this locality.

Litchfield, Michigan, 31st.—Springs are very low for this season of the year.

Topeka, Kansas, 20th.—Owing to protracted drought, wells and cisterns in this vicinity are very low.

Westborough, Massachusetts, 31st.—The streams and wells are as low as during the severe drought of one-hundred and fifteen days duration of last summer.

MIGRATION OF BIRDS.

Geese flying southward.—Red Bluff, California, 9th, 10th; Fort Madison, Iowa, 30th; Muscatine, Iowa, 4th; Newport, Rhode Island, 9th. *Flying northward.*—Augusta, Georgia, 12th, 13th, 14th; Fort Madison, Iowa, 4th, 13th; Swanwick, Illinois, 28th. *Flying westward.*—Creswell, Kansas, 24th. *Flying eastward.*—Cape Mendocino, California, 21st.

Ducks flying southward.—Erie, Pennsylvania, 10th; Coleman City, Texas, 7th. *Flying northward.*—Fort Macon, North Carolina, 12th.

NOTES AND EXTRACTS.

The following extract is taken from the "Scientific American" Supplement, No. 370, of February 3, 1883.

SURFACE TEMPERATURES IN PARIS.

Edmond and Henri Becquerel have presented to the French Academy their observations upon the temperatures of the air and earth during the year 1880. They find that at the upper surface of the ground, when covered with snow, the temperature was maintained almost constantly in the neighborhood of -1°C . (30.2°F .), and did not fall below -1.5°C . (29.3°F .), although the temperature of the air, as well as that of the upper surface of the snow, varied from -15°C . (5°F .), to 0°C . (32°F .). The diurnal variations of temperature at the surface of the soil were perceptible under a mass of snow of 0.25 meters thickness (9.84 inches), but they never exceed a few tenths of a degree; moreover, the differences in the observed temperatures at different depths in the snow varied nearly in proportion to the depth. These results show that a bed of snow, when the temperature is below 0°C . (32°F .), has a feeble conductivity, and behaves like a conducting body traversed by a calorific wave. Under a surface which is covered by turf, the variations are much more feeble than under a surface of gravel or loam. The network of rootlets constitutes an almost complete non-conductor. Each bed of soil is submitted to the influence of two calorific effects; one due to the variations of external temperature; the other to the action of the deep layers which tend to produce a constant temperature. The amplitude of thermometric oscillation which results from these complex effects, when there is any disturbing influence, such as an infiltration of water, varies inversely with the depth of the bed.—*Comptes Rendus*.

CHART I. Tracks of Low-Barometer Areas, January, 1883.

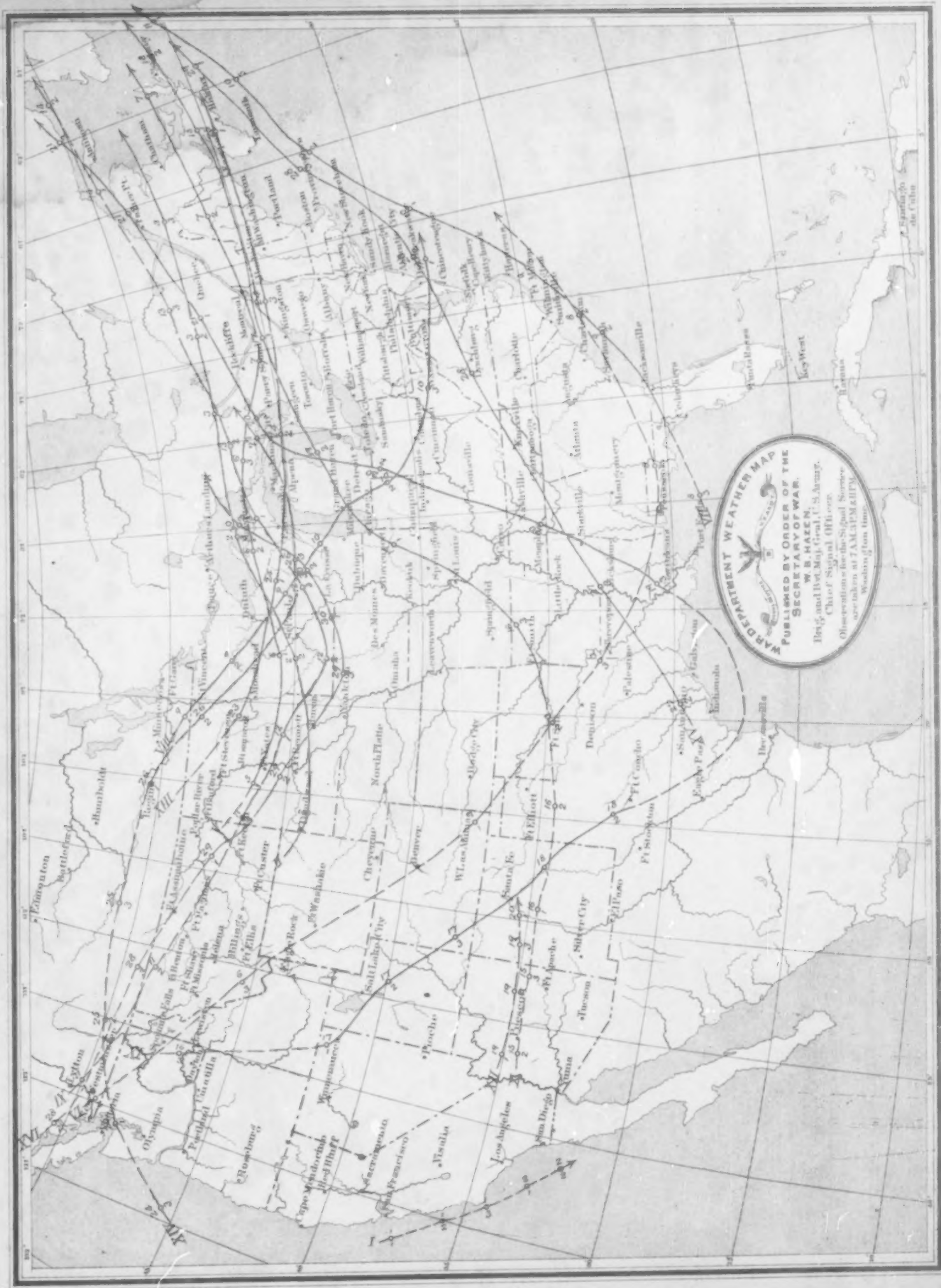
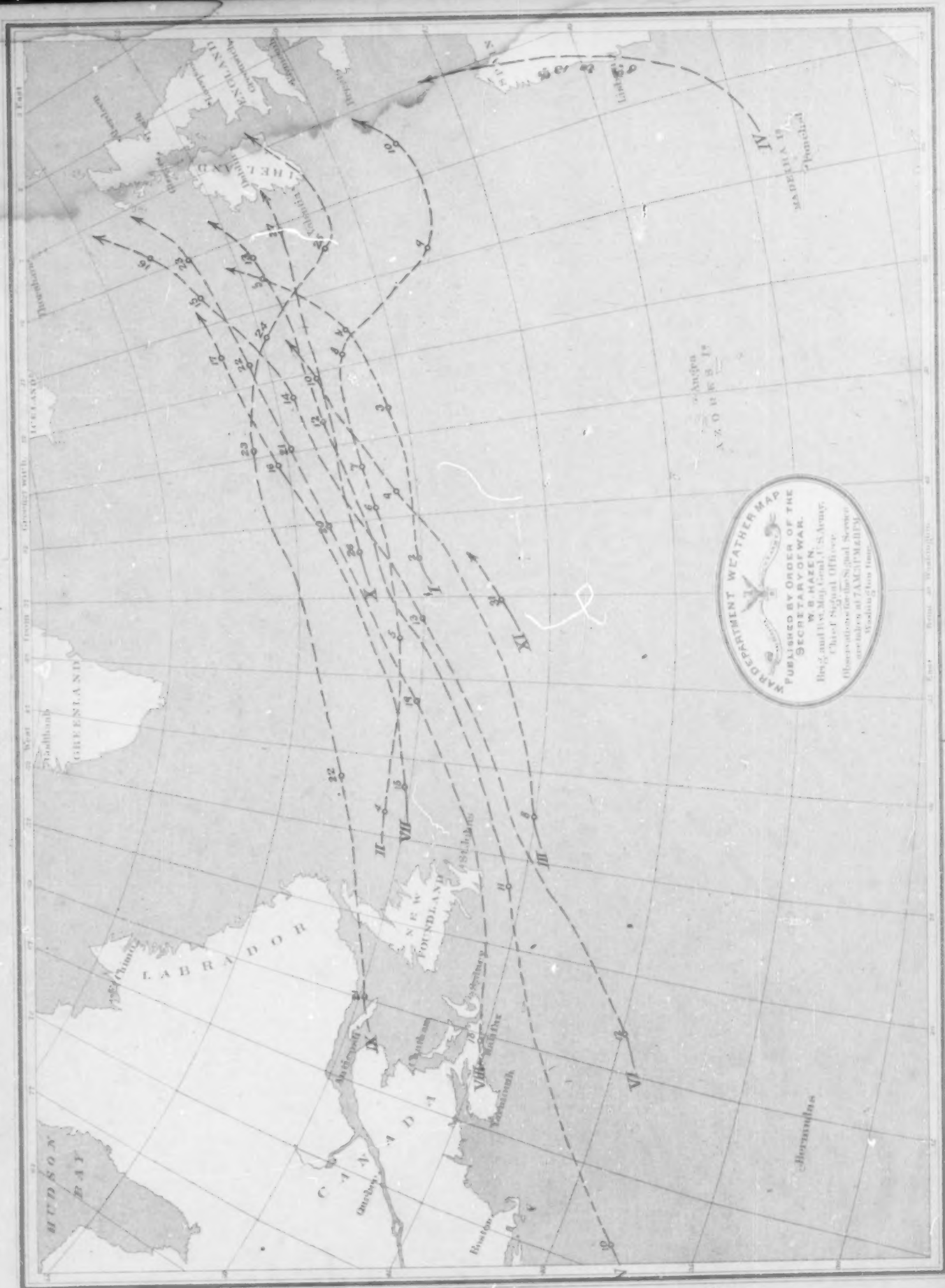


CHART II. Ocean Storm Tracks, January, 1883.



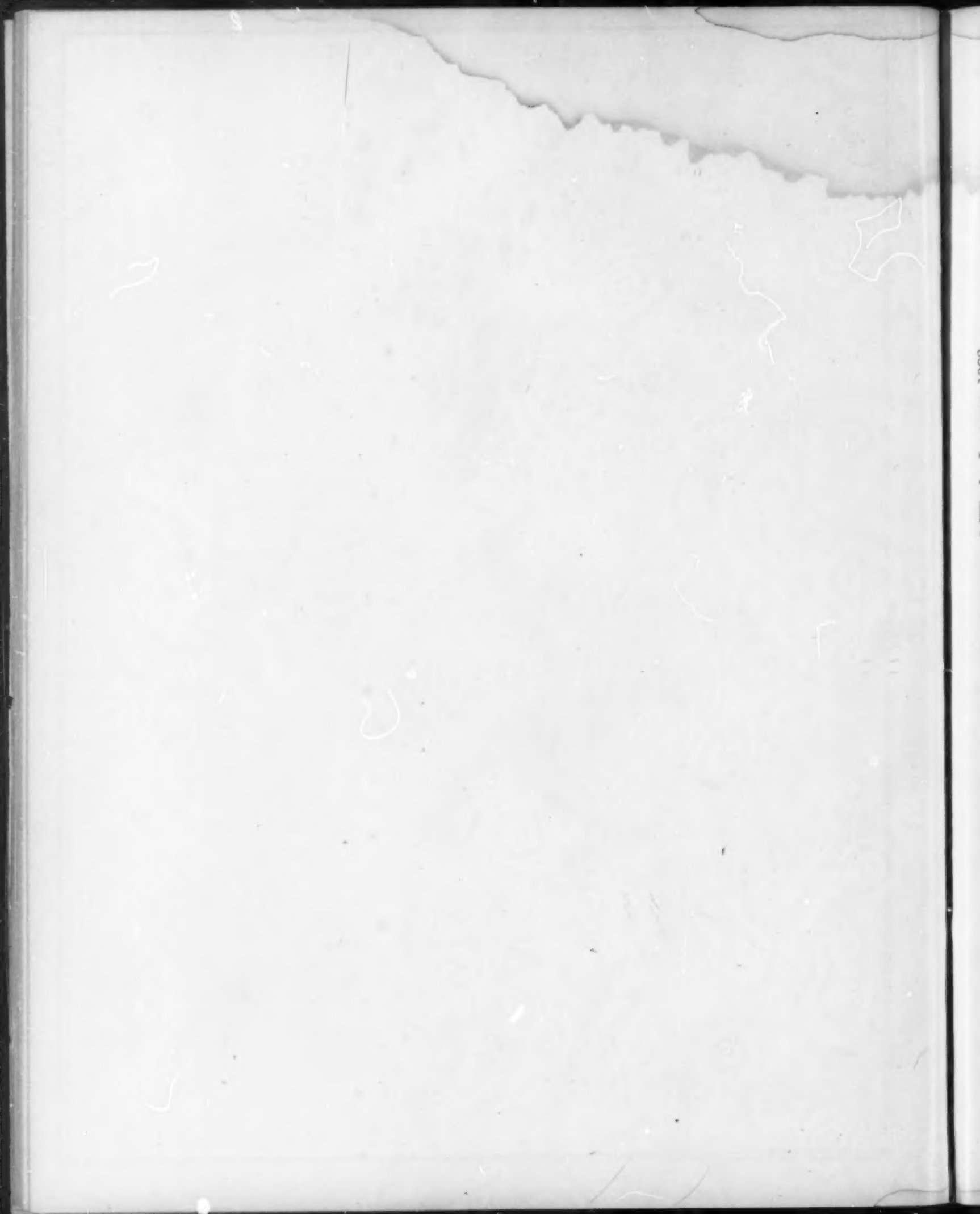


CHART III. Isobars, Isotherms, and Winds, January, 1883.

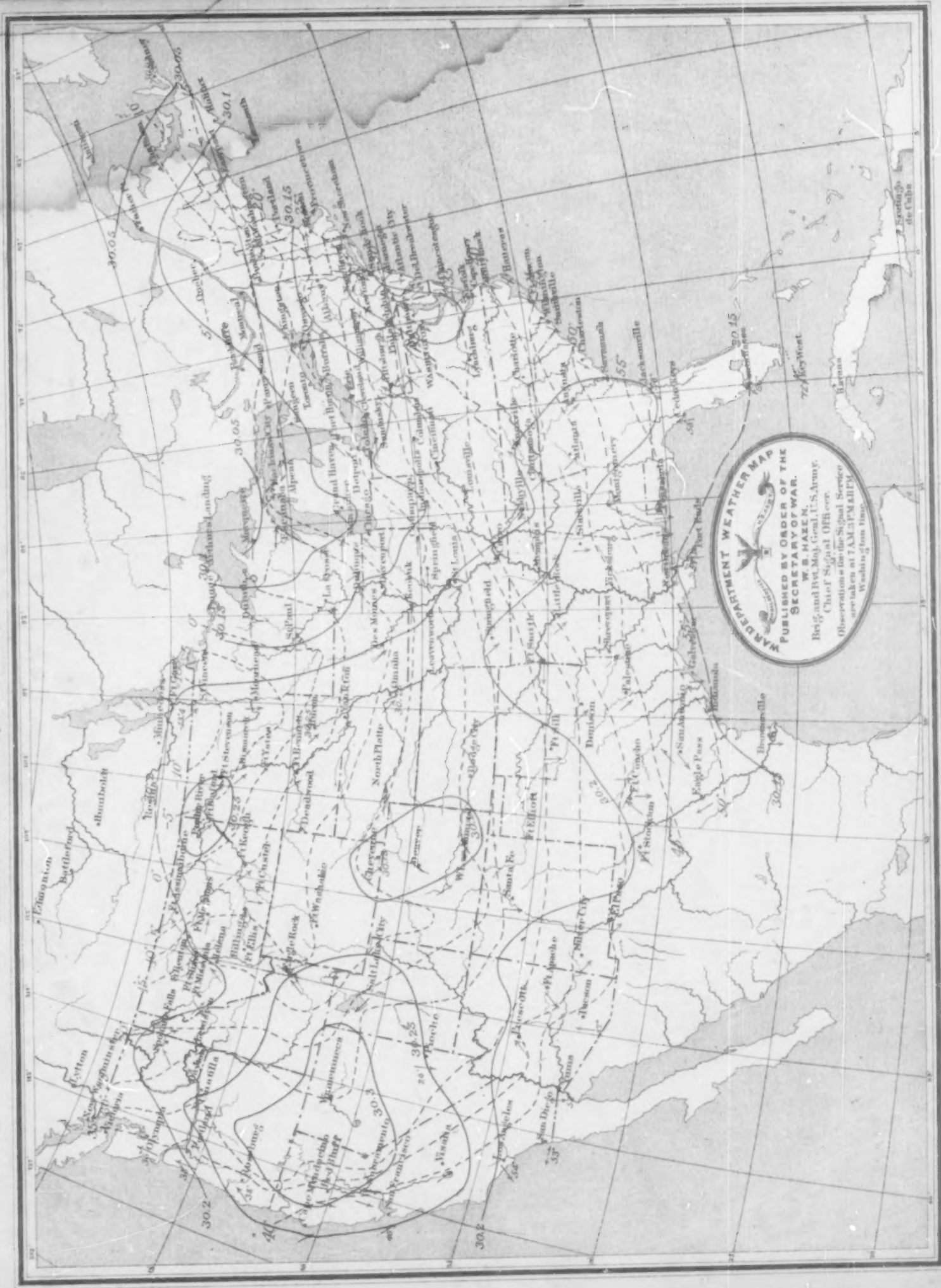


CHART IV. Precipitation, January, 1883.

